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1863 Some Examples of 1920

# Early Machine Design

by

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IN these days of high-speed and high-powered machine tools the average mechanical man, particularly if he be a designer of machine tools, is apt to look upon the accomplishments of his remote predecessors with a degree of commiseration that is more or less tinged, though no doubt subconsciously, with contempt. When he compares the chaste lines, the massive and rigid construction, the powerful drive of the modern lathe, shaper, planer, or milling machine with its sometimes weak-kneed and spindle-legged prototype of fifty years ago, with its panels and columns adorned with ornate scrolls and intricate designs in bas-relief, it gives him a gratifying sense of superiority in having made more of his opportunities than did the old-time designer and builder.

*In the mad rush for production and still more production which has characterized nearly all manufacturing industries during the last quarter century, may we not in our demands for power, strength and speed, have overlooked some of the possibilities of the machinery of an earlier day.*

He sometimes overlooks the fact that modern machine design is not based alone upon scientific knowledge and theory, but that it is to no small degree the slow progress of evolution, building upon the groundwork of previous experience, modifying already established ideas to meet changing conditions, profiting by demonstrated weaknesses of the earlier machines, adding to their strength by redistribution of material, and eliminating such features as have been proved to be unnecessary.

The present-day designer begins where his immediate predecessor leaves off. He has concrete examples of design from which to draw inspiration. He already knows some of the things he must avoid as well as the lines that he can safely follow. His work is to some extent the unconscious embodiment of the practices and principles of yesteryear, modified by the knowledge gained from more recent experience and experiment. A successful machine designer once said to the writer: "Anybody can improve; it takes a man with brains to create."

The designer of 75 or 100 years ago was a creator. He had little precedent and practically no source of inspiration but nature and his own brain. It is therefore not surprising that when he reached the limit of his imagination he should turn to nature for assistance.

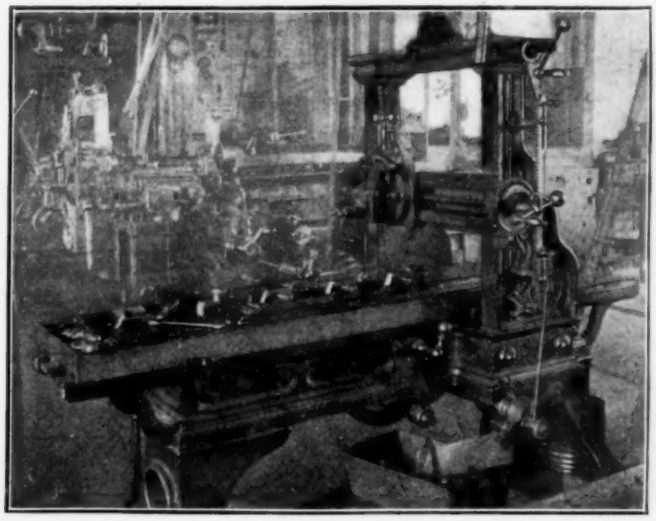


FIG. 1. PLANER BUILT BY PUTNAM MACHINE COMPANY HAS BEEN IN SERVICE MORE THAN FIFTY YEARS

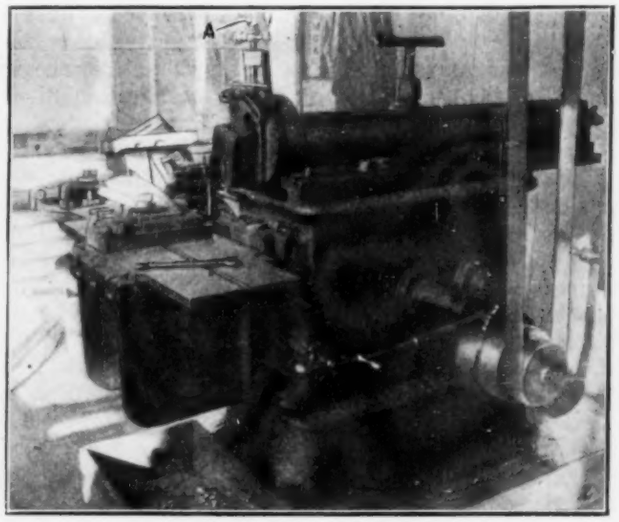



FIG. 2. SHAPER BUILT IN THE SHOPS IN 1879

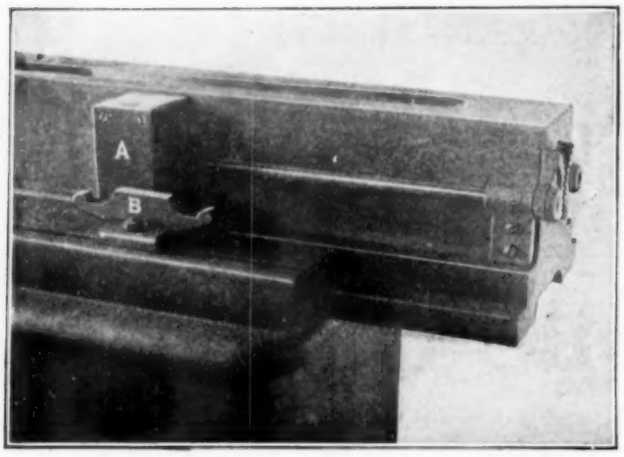



FIG. 3. DETAILS OF FEED WORKS

This may explain why the column of an old time drilling machine looks like the trunk of a tree, or the legs of a planer resemble the legs of a horse. It might help, too, to explain why otherwise bare surfaces of iron should be adorned with sun flowers, fig leaves, and other things foreign to a machine shop.

Nature has a way of combining beauty with utility and it is but natural that the pioneer in machine design should try to follow her lead. It is also but human that he should overlook the element of congruity in nature, which oversight is perhaps the basis of one of the most valid of the criticisms directed against old machinery. Clusters of leaves and bunches of fruit are very beautiful—on a grape vine; they are also necessary to the life of the vine. They are not a necessary adjunct of a machine for planing iron, and being out of place are not beautiful.

Whatever was in the average old-time designer's mind when he was laying out the elaborate panels, curves and curlicues with which he sought to adorn his product, his main idea was utility, and though his attempt to add to its attractiveness must have added a considerable sum to the cost of manufacture, the superfluous "gingerbread work" did not detract to any extent from the productive capacity of his machines, which was usually in keeping with the knowledge and practice of mechanics of that day.

That the old school of machine design did not fall so far short of present-day ideals is evidenced by the fact that many such machines, built fifty, sixty, or even more years ago are still doing valiant service in competition with up-to-the-minute machines of their own class.

The photographs accompanying this article were made in a large New England manufacturing plant, where many of these old machines are upholding their particular link in the chain of production, sandwiched in between massive machines that embody the latest ideas in machine-tool construction.

It would be fatuous to say that a machine tool built before the civil war could remove as much metal per unit of time as one built last year—it could not; its capacity in that respect would appear very limited by comparison. But removing metal is far from being the sole duty of a machine tool. The work has to be held during the process of removal, and the amount of material to be removed is seldom determined by the capacity of the machine to remove it.

The special line of machinery built by the above mentioned establishment has as some of its component parts long slender castings of gray iron and equally long, and even more slender, pieces of steel. The problem is not to remove a large quantity of metal, but to remove what is necessary and do it as quickly as possible, without permanently distorting the work.

The company in question had its origin in a country blacksmith shop in the decade of 1840-50 and by growth and absorption of other companies and individuals engaged in the same line of work the plant now covers many acres and has well over a thousand employees.

Some of the old machinery now running was first installed by the parent company and has been in continuous service for over sixty years; other machines came to it through its acquisition of other businesses and their age can only be guessed at.

The planer shown in Fig. 1 was built by the Putnam Machine Co., of Fitchburg, Mass., and is one of the machines acquired by its present owner upon the absorption of a smaller company in 1870. This is a good serviceable tool and is constructed along lines that are still considered good design. Its housings are hardly deep enough to insure rigidity when planing a piece of work the height of which represents the limit of the machines capacity, but there isn't the slightest chance of such a piece coming to it while on its present job. The height of its cross-rail has probably not been altered in years, and with it in the position shown in the picture the machine is sufficiently rigid.

The deep carving on the side of the housing, the device on the tie bar, and the paneling of the box bed no doubt furnished many hours of congenial occupation

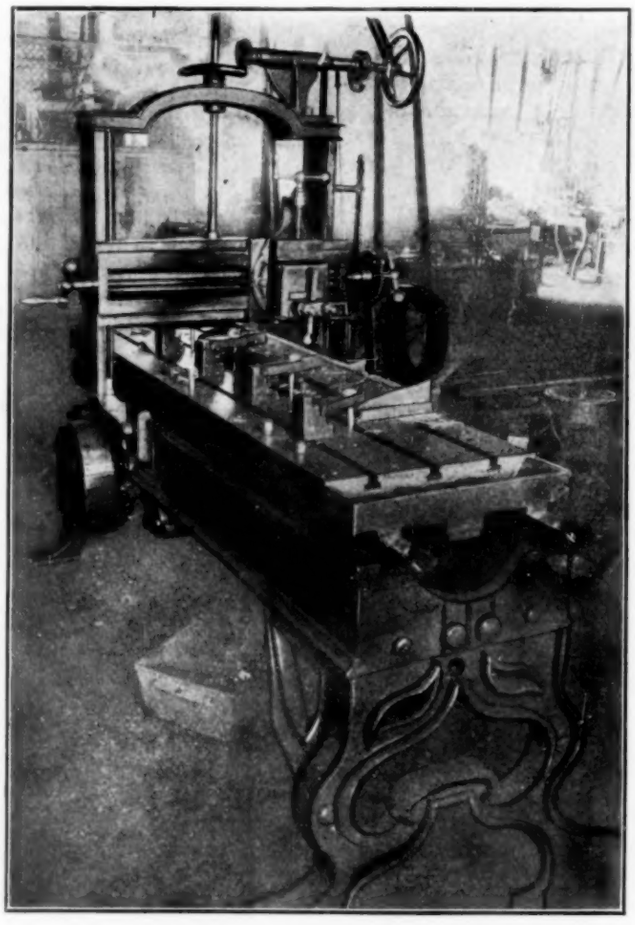


FIG. 4. UNIQUE VERTICAL FEED ON PLANER

to a pattern maker who was also an artist, but must have caused the foundryman some consternation when he was confronted with the problem of molding the pieces.

The reader will note that the designer had the "long bed" idea, but that he adopted what would seem a questionable method of securing it. However, the vicissitudes of upwards of fifty years have left the extension brackets (cast in one piece with the bed) intact, and the fact that the machine still planes flat on pieces several feet long indicates that the foundryman knew his business and the builder recognized the necessity of "seasoning" his castings.

To those of the readers who are familiar with Pratt & Whitney construction, the similarity of the feed movement in this and other planing machines will be apparent. The reason for this is not that all the older machine builders designed this movement simultaneously, but that years ago a master mechanic in this shop, himself a product of the Pratt & Whitney factory, rebuilt all these old planers, adding such features as seemed to him advisable.

Besides rebuilding old machines the master mechanic mentioned above built some new ones, embodying therein ideas and features of design which he had absorbed during his apprenticeship days. Thus in Fig. 2 may be seen a shaper which any old-time mechanic and many later ones would unhesitatingly indentify at first glance as a Pratt & Whitney machine. It was, however, built in the shop where it now stands, many miles from Hartford, and has never been elsewhere. It was built in 1879 and was one of a lot of three still in active service.

On close observation it will be noted that the machine is heavier than the Pratt & Whitney shaper, though this difference is less apparent in the picture than in the actual machine. In all its movements it is a close copy, with the exception of the vertical feed, which differs from any the writer ever saw.

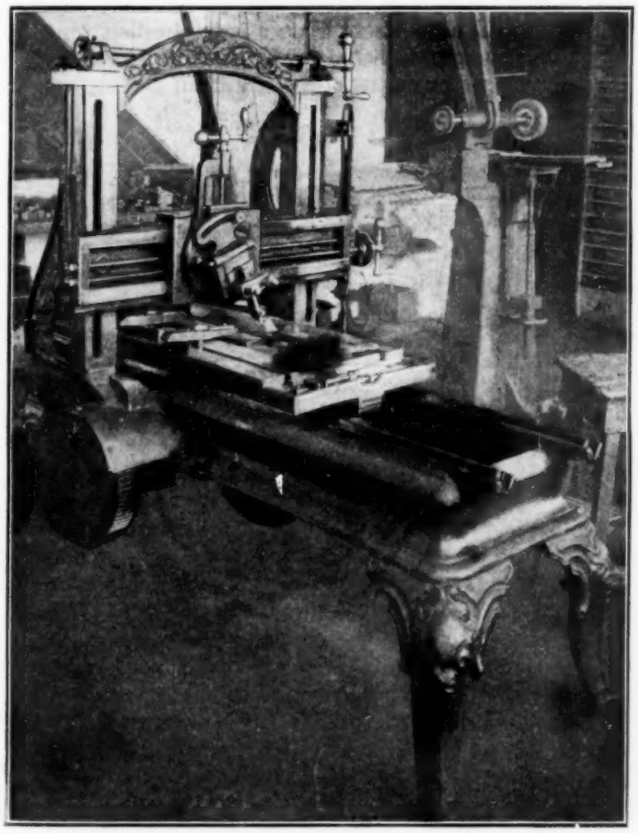


FIG. 5. PLANER BUILT PRIOR TO 1870 BY NEW HAVEN MANUFACTURING CO.

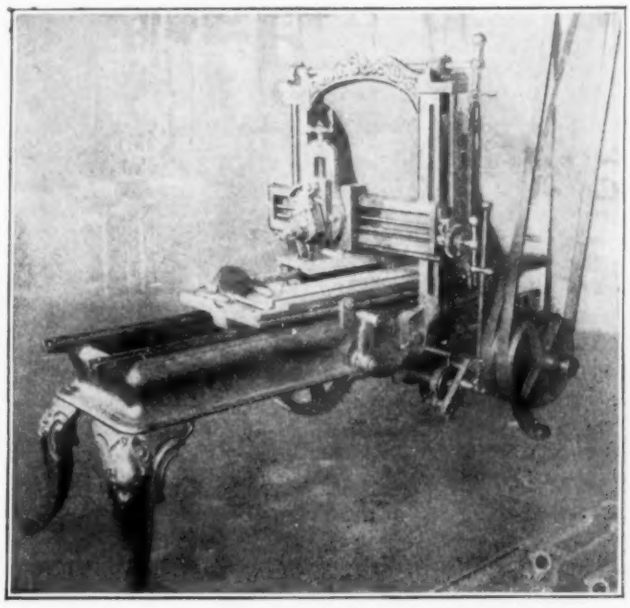


FIG. 6. PLANER BUILT PRIOR TO 1870

This movement is shown in greater detail in Fig. 3. A square box-like projection from the side of the ram at *A* houses a short rack which has a vertical movement, and a pinion, which is mounted on the end of a short shaft running parallel to the ram. At the rear of the ram this shaft is geared, through the medium of a pair of gear sectors, to a shaft which extends longitudinally through the ram and ends in a small bevel gear just under the vertical slide.

This shaft is the center upon which the head swivels for the planing of angles other than 90 deg., and the bevel gears operate a spindle or shaft which is enclosed within the hollow vertical-feed screw, giving a forward and back movement to a ratchet wheel (*A*, Fig. 2) just above the crank handle that turns the screw. This part of the movement is the same as that applied by Pratt & Whitney to their planers.

The short rack above referred to at the side of the ram has a stud and roller at its lower end projecting outwardly to contact with the stationary cam *B*, Fig. 3, so that at each stroke of the ram the feed movement is given a reciprocating movement that is transmitted through the mechanism above described to the ratchet wheel at the top of the vertical-feed screw.

A pawl attached to the crank handle may be thrown into engagement in either direction with the ratchet wheel, thus providing for either up or down feed.

The cam *B* is adjustable so that by placing it at one end or the other of the stroke for which the machine is set, the feeding movement may be made to take place at the most favorable point and at whatever degree of amplitude is desired.

A planing machine whose simplicity of outline would seem to imply a later origin is shown in Fig. 4. It was built in Nashua, N. H., by Gage, Warner & Whitney, and is a part of the machinery acquired by the present owners in taking over the business and equipment of a smaller concern in 1872. It was by no means a new machine at that time, and it has had many vicissitudes. Originally placed in service in Woodstock, Vt., it was

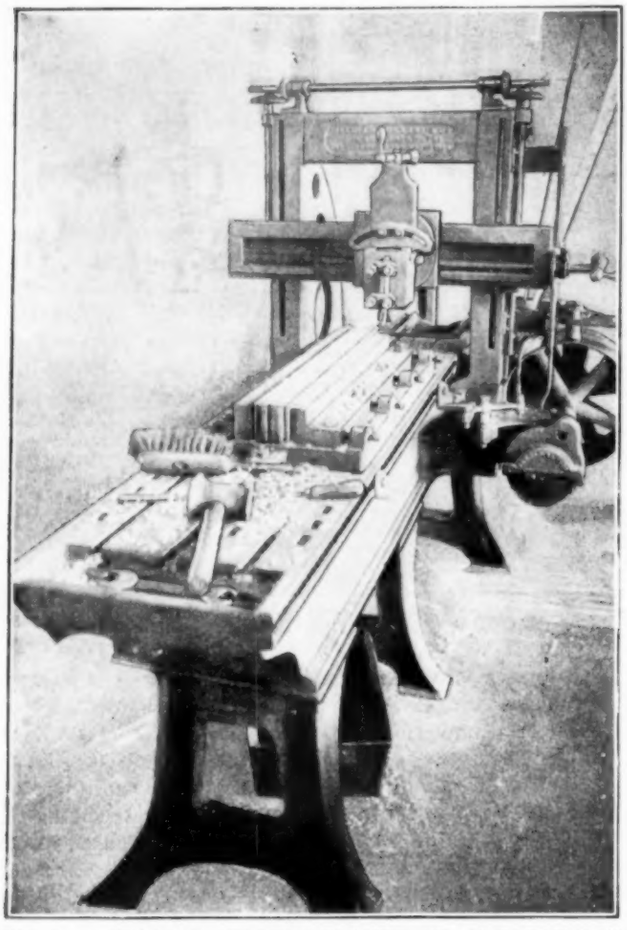


FIG. 7. A WILLIAM SELLERS PLANER OF AN EARLY DAY

later shipped to Smithville, N. J., and after a stay of some years was shipped, in the year mentioned above, to its present location.

On its trip from New Jersey to Connecticut it was a part of a consignment of machinery aboard a small schooner which met with disaster, and for a period of several months the planer, with other machines, lay at the bottom of Long Island Sound while the owners considered whether or not it was worth salvaging.

With the exception of the vertical feed, the machine might almost be considered of modern design. The cross-rail is gibbed to the face of the housings, riding upon deep V-shaped ways similar to the shears of a lathe. The V's are made exceptionally deep in proportion to their width to forestall any tendency of the rail to tilt to one side by reason of meeting with greater resistance at one end than the other.

Power is applied through the single elevating screw in the middle of the tie bar, the nut of which is rotated through the medium of bevel gears actuated by the ratchet and pawl movement or by means of the hand wheel. The nut passes clear through the tie bar and has a thrust-collar on the under side so that the movement of the cross-rail is positive in either direction. The tool slide has the usual hand operated vertical movement.

In Figs. 5 and 6 may be seen a planer built by the New Haven Manufacturing Co. that has been in continuous service for more than sixty years. Though there is considerable gingerbread work in evidence, the machine does not differ fundamentally in design from the product of 1919.

Another one is shown in Fig. 7 built in 1864 by William Sellers. It was originally a screw planer; a nut on the underside of the platen encircling a coarse lead screw that ran the whole length of the bed. This form of drive was smooth and powerful, and possessed the advantage that a careless operative could not run the platen out of mesh with the bull gear, but he could, and sometimes did, jam the nut against the bearings at the end of the bed, from which predicament it would require as much assistance to remove it as would be needed to replace a runaway platen.

This machine was given a thorough overhauling some years ago during which it was changed from a screw to a rack driven planer, the drive being through a skew gear mounted upon an angular shaft and occupying about the same position as the bull wheel of the ordinary drive. The machine has given continuous and satisfactory service, both before and after the change.

In the same shop are several examples of early milling machines that have survived the competition of newer machines, and for the same reasons; the amount of material to be removed is so slight and the piece produced so slender that the light machinery of a bygone day can do the work as well and as rapidly as the nature of the piece will allow.

The milling machine shown in Fig. 8 was built by Ezra Gould some years before the Civil War. The platen of this machine moves only in a direction at right angles to the spindle, and the vertical adjustment is secured by raising or lowering the head. There is no provision for adjustment transversely.

The head is practically in one piece, including the over arm, and is provided with a supporting brace tying the outer end to the bed. A large gear on the spindle is driven by a pinion mounted on a swinging sector, the pinion being a part of the driving pulley. Any change in the vertical adjustment thus affects the belt tension, which must be compensated for by moving the sector.

A similar sector on the opposite side of the main gear

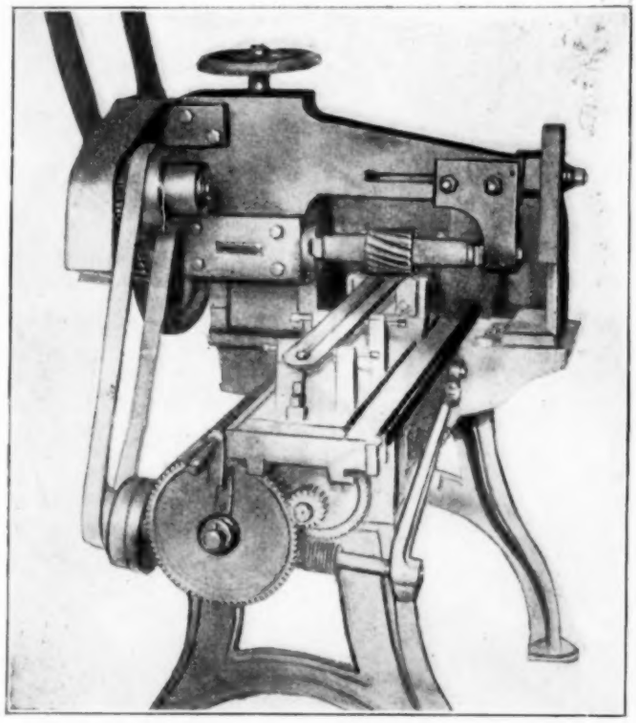


FIG. 8. A PROGENITOR OF MILLING MACHINES

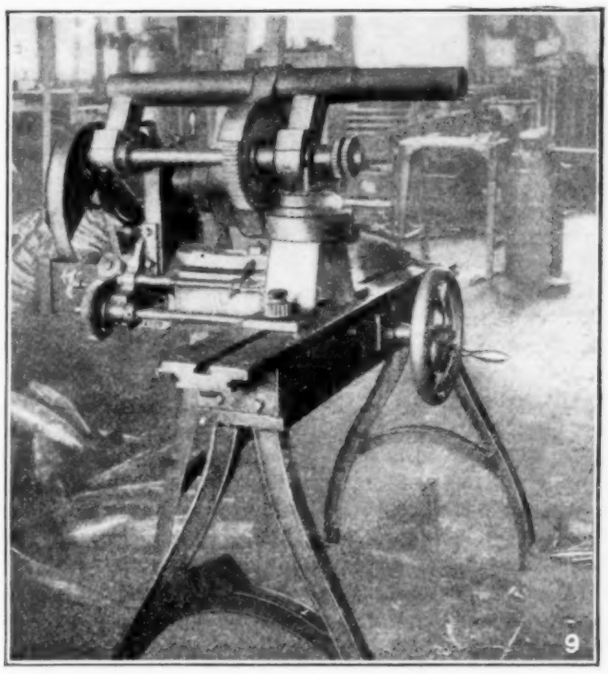


FIG. 9. A STEP IN THE EVOLUTION OF THE MILLING MACHINE

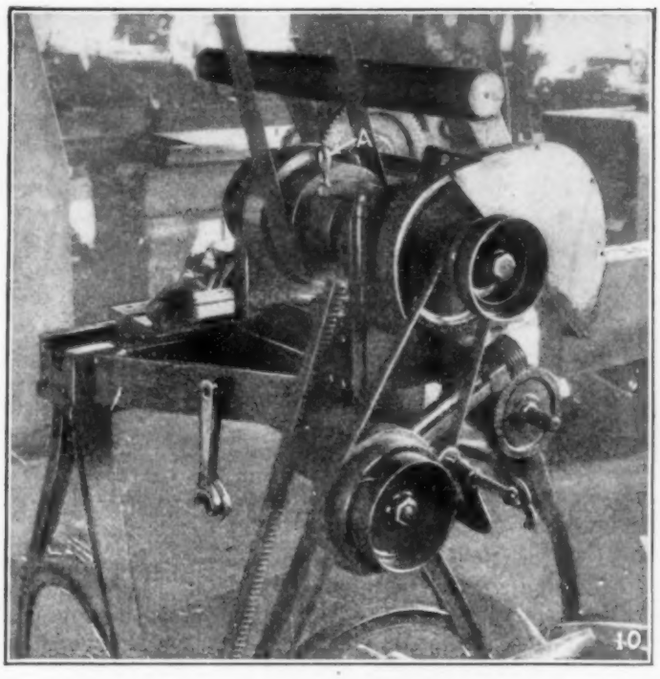


FIG. 10. REAR VIEW OF MACHINE SHOWN IN PREVIOUS FIGURE

carries a pinion and small cone pulley for the feed belt, and this must also be readjusted every time there is any appreciable vertical movement.

Power feed is applied through the medium of a worm-wheel on the traverse screw into which meshes a worm that is keyed to a short shaft supported in a swiveling bearing. The free end of this shaft is held with the worm in mesh by a latch that can be tripped by an adjustable dog on the platen. This movement is the same in principle as that applied to the Lincoln type of machine, and also to the power feed of certain engine lathes of an earlier period.

A machine of this construction would obviously not be appreciated by toolmakers who must have every movement under instant control, but once set for a certain cut the machine is rigid and reliable. With a high-speed steel cutter it can remove what metal is necessary on this particular job as rapidly as the nature of the work will stand and is therefore able to compete with modern milling machines because of its being kept continuously at work on the one piece of work to which it is assigned.

Figs. 9 and 10 show, respectively, front and rear

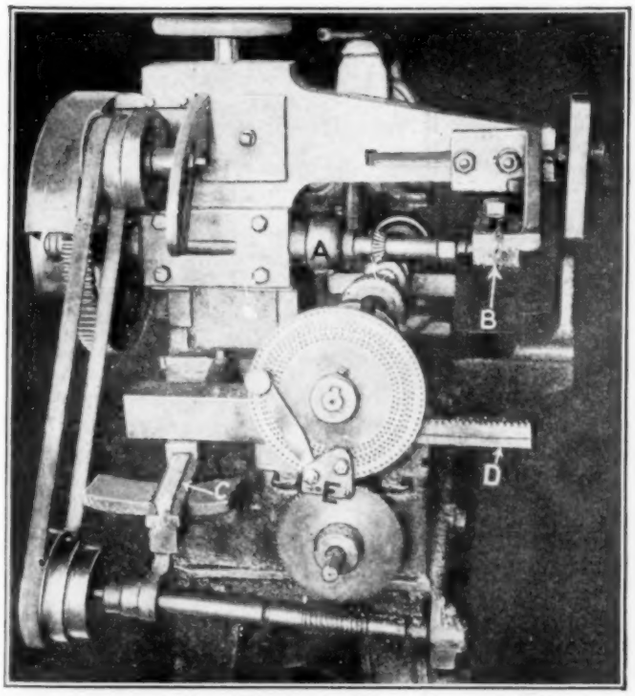



FIG. 11. ONE OF THE FIRST OF "UNIVERSAL" MILLING MACHINES

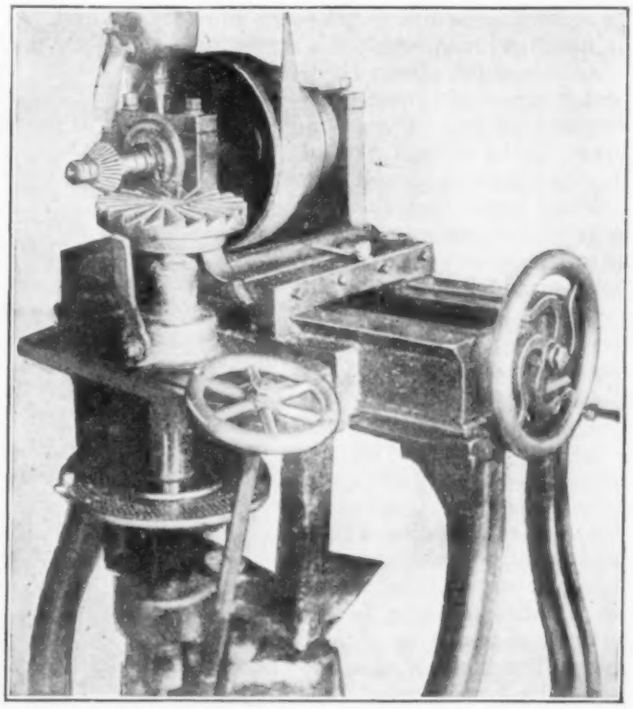


FIG. 12. OLD MILLING MACHINE ADAPTED TO SPECIAL PURPOSE

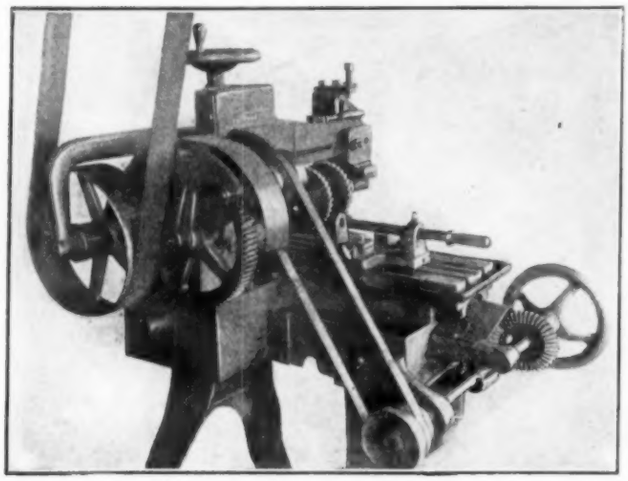


FIG. 13. FURTHER DEVELOPMENT OF THE MILLING MACHINE

views of a modification of this machine. The original machine was similar to the one shown in Fig. 8, the additions being made in the shops of its present owner. It was in service in 1867, which is the limit of the memory of the oldest employee, and was not a new machine then.

The table of this machine has a rack-and-pinion-operated traverse and the entire head is adjustable crosswise, sliding upon shears similar to those of a lathe. This adjustment is made by a screw, turned by a small handwheel located just back of the larger one seen in the picture.

What might be termed the main bearings of this machine carry the shaft upon which are the driving and feed cones. This shaft has no vertical movement and thus the belt tension is not affected by adjustment. The cutter spindle is mounted in a swinging frame of which the overarm is a part, and this frame swivels about the driving shaft, being turned by a wormwheel and worm moved by the small crank handle *A*, Fig. 10.

Substantial clamping bolts are provided at each of the bearings upon which the frame swivels to lock the latter in position after adjustment is made, but these bearings have not only to resist the thrust of the cutters, but of the driving gears as well, and it would seem that the machine was extremely susceptible to accidental change of adjustment under a cut. That it is not so in fact is evident from its survival of over fifty years' service. Another machine of similar origin, shown in Fig. 11, has been adapted to work that is the usual prerogative of the "universal" milling machine. The factory uses in its regular output large numbers of helical-fluted milling cutters, and the special job of this machine is the cutting and re-cutting of these flutes. The table of this machine does not swivel and therefore other means must be provided to bring the line of action of the cutter into coincidence with the helix angle of the work. This is done by connecting the cutter arbor to the machine spindle through the medium of a universal joint *A*, and supporting the outer end of the arbor in a bearing *B* that is horizontally adjustable in a direction at right angles to the center line of the spindle.

This bearing is held to the bracket on the overarm by a single stud passing through a slot, so that adjustment is made by loosening a single nut and sliding the bearing along until, in the judgment of the operator, the cutter is in correct position. This requires skill and experience on the part of the operator, as there are no graduation marks to assist the setting, but as the work is really toolmaking and the machine run by apprentices under the eye of an experienced toolmaker, this lack does not constitute a serious drawback.

The blank is rotated during the cutting by means of an adjustable slide bar *C*, similar to the taper bar of a lathe; the slide being connected to the rack *D* which meshes with a gear loosely mounted on the main spindle of the index head. To this gear is attached the sector *E* carrying the index pin, so that as the table advances the whole mechanism is turned to correspond to the required helix angle. Indexing is accomplished by withdrawing the pin (in whatever position it happens to be) and turning the index plate past the number of holes that gives the required division.

Setting the taper bar, in conjunction with setting the bearing *B*, a necessary part of resetting the machine for a new helix angle, requires the services of the toolmaker, but once set the machine is as capable of turning out its product as well and as rapidly as a modern universal milling machine.

The machine shown in Fig. 12 is a different design but is contemporaneous with Fig. 11. The head of this machine moves along the shears on top of the bed in a direction at right angles to the center line of the spindle, while the latter is adjustable lengthwise by a screw, the handwheel of which may be seen at the rear of the head.

The vertical indexing spindle was added in this fac-

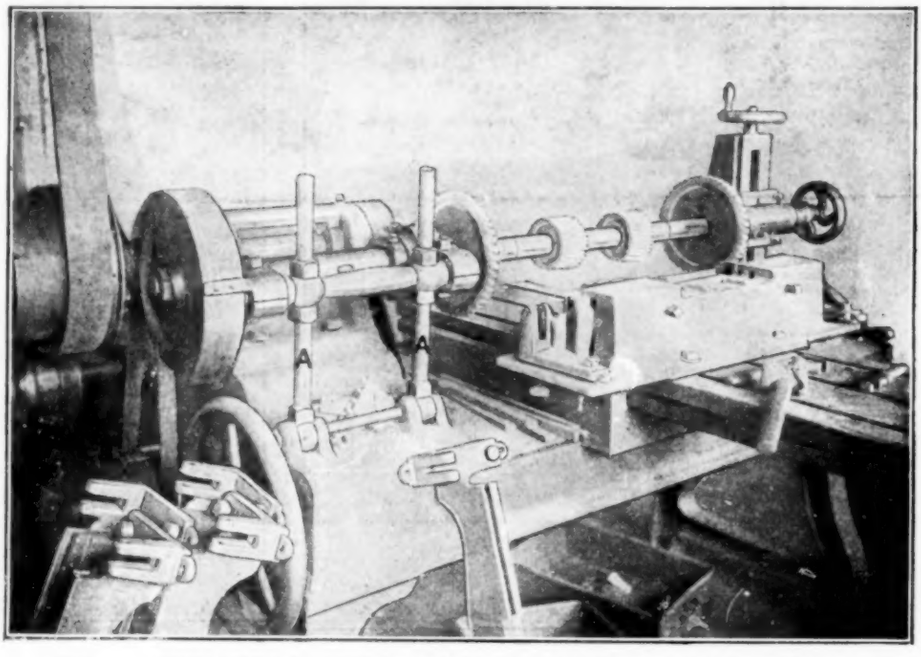


FIG. 14. BUILT IN 1867. A CONTEMPORARY OF THE "LINCOLN" MILLER

tory when the machine was adapted exclusively to the cutting of large face mills, one of which is shown in place. The index plate may be seen below the upper main bearing, and though the locking pin does not show to advantage, its manner of operation is clear. The handwheel on the upper end of the angular shaft gives a convenient means of turning the spindle when indexing, connection being made through a pair of angular gears at the lower ends of the respective shafts. The wrench seen below and in front of the work operates a clamping ring contained within the upper bearing, rendering the work rigid while under cut.

Another milling machine is shown in Fig. 13, built by Gould and Eberhardt at a somewhat later date, and beginning to show the characteristics of the modern milling machine. Its principal interest lies in the fact that it represents an early stage in the evolution of machine design. This machine, like the others, maintains its place as a link in the productive chain because of its having been adapted to one special job and kept continuously at work on that job, of which it is as capable as a more modern machine.

In Fig. 14 may be seen a milling machine built in 1867 or before, to make practically the same cuts on the same parts as it is making today. It has many features in common with the well-known "Lincoln" type of machine but was probably developed independently of the latter. Its cutter spindle is carried in a swinging sector after the manner of the machine shown in Figs. 8 and 10, but when it is adjusted it is held firmly in position by locknuts on the bolts *A* which are swivelled at their lower ends to adapt them to the swinging movement of the head. The outboard bearing is adjustable in two directions for the same purpose. Except that the table traverse is much longer, the details of its movement are much the same as in the Lincoln.

A special Lincoln milling machine built by Pratt & Whitney for the job with which the picture shows it occupied is shown in Fig. 15. This is a comparatively youthful machine, dating only from 1888.

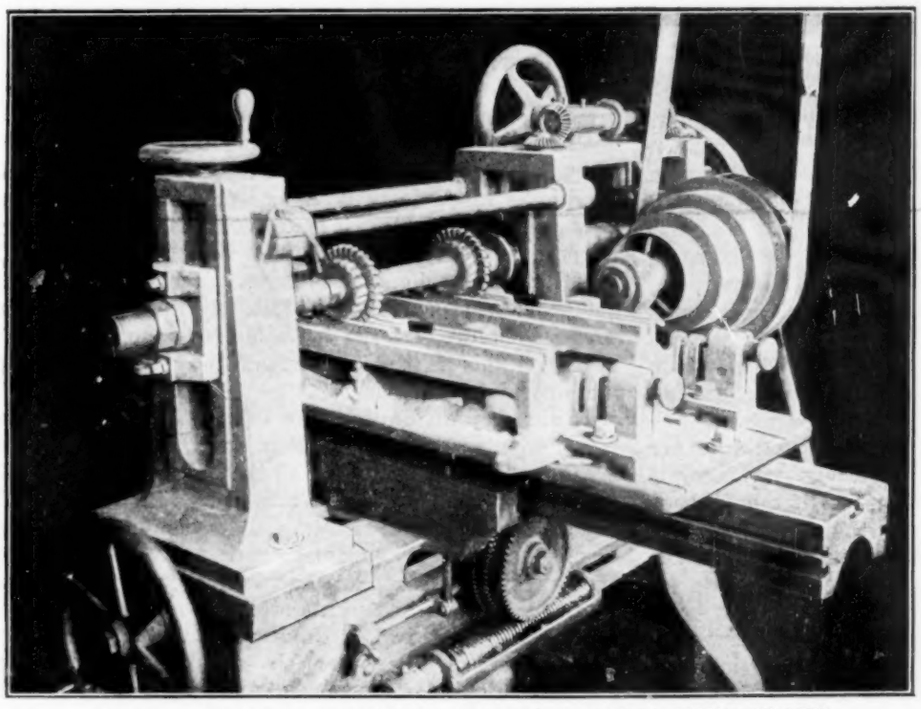


FIG. 15. A SPECIAL "LINCOLN" MILLING MACHINE BUILT IN 1888

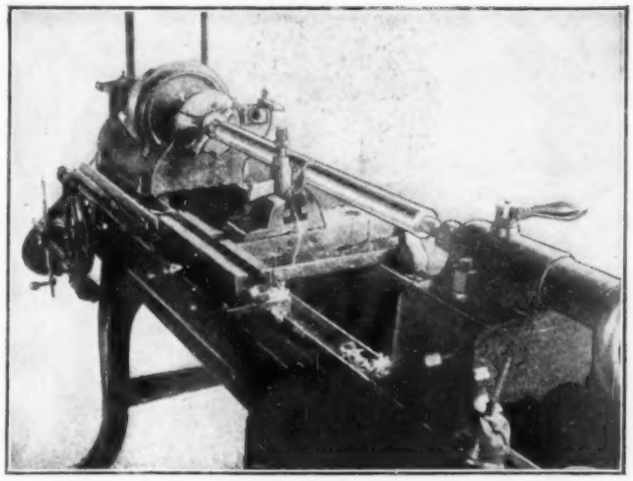


FIG. 16. A PATRIARCH. THIS LATHE HAS ALMOST OUTLIVED ITS USEFULNESS

Probably the oldest machine in the shop that is in regular service is the lathe shown in Fig. 16. There are in the employ of the company several men who have been contiuously with it for fifty years, and this lathe was the "old lathe" to these men when they were boys, fifty years ago.

Many of the old-time mechanics are familiar with this tool. It has a short shaft running across the bed under the headstock, and from a sprocket on this shaft, inside the box bed, a chain runs to an idler at the other end of the bed.

On the outer end of the cross shaft is a handwheel, or rather what once was a handwheel, for it long ago lost its wooden rim, and just inside it a worm wheel by means of which the power feed is obtained. The carriage is attached to the upper side of the chain.

There is of course a great deal of slack or lost motion resulting from this form of feed, especially when feeding the carriage to the right or toward the tailstock. As long as the resistance of the cut is constant it works very well, but if the tool strikes a hole or a soft spot, the carriage is likely to jump forward a half inch or so, causing extreme annoyance to the operator, to say nothing of what happens to the work. For turning shafts of homogeneous material and symmetrical shape the lathe is serviceable, but for working on castings or rough forgings it leaves much to be desired. It holds its place on the floor among modern tools more from sentimental than practical reasons. In Fig. 17 may be seen a tool that was regularly used sixty years ago for cutting splines or keyways in small gears. It was incidentally the only drilling machine in the shop at that time. For cutting a keyway the tool was fixed in the spindle, being held by a setscrew in the same manner that the straight-shanked

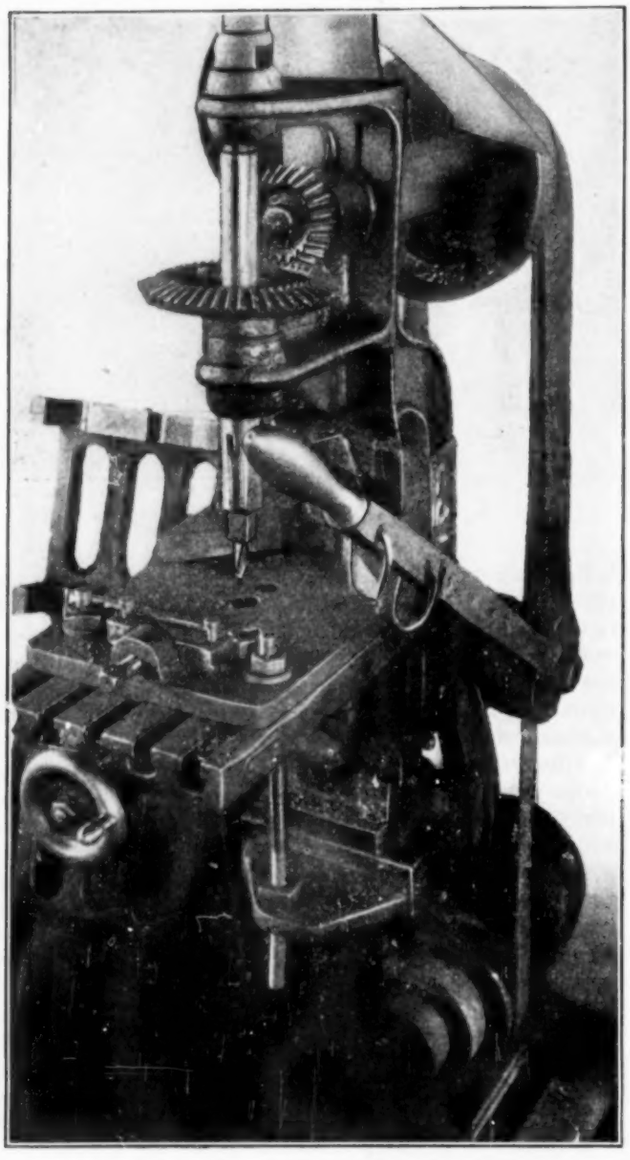


FIG. 17. A "KEY-SEATER" OF 1863, NOW RETIRED

drills of that period were held, the spindle fixed so that it could not revolve, and the table moved up and down by means of the lever while the work was held in the vise and fed forward to the cut by the small handwheel in front.

While it does not seem possible that this device could compete with modern machines built for the purpose, I am assured by the older workmen that given a small quantity of gears in which to cut keyways the job can be finished in less time than will be required to set up and complete the job with the big, modern key-seating machine that has displaced it.

That the company operating these old machines are considerate of their men as well as their machinery is evidenced by the number of employees that have been continuously in their service for fifty years. There are five men at least who hold this distinctive and honorable record, though not all of them were available for photographing at the time of the writer's visit, some having been retired on pension. Of the six men whose portraits appear in the head piece of this article, one entered the employ of the parent company in 1863, one in 1867, two in 1870, one in 1874, and one in 1878.

That the conservation of men and machinery is not philanthropy, but business, is evidenced by the fact that this plant where both are employed is a live, up-to-the-minute concern, and a leader in its line. There are in its workshops many machines embodying the latest mechanical ideas, while the engineers are constantly adding machinery specially designed to meet their requirements.

## Questions of Shop Ethics

By F. W. Munson

In writing under the title "Rules of Etiquette for Foremen" on page 437 of the *American Machinist*, Mr. Charles D. Folsom brings up some important questions, not the least of which is the one relative to raising the wages of individuals.

If the foreman grants a raise to Bill and does not give one to Sam, Sam is mad and perhaps quits his job; while if Sam gets the raise to keep him quiet, there is a dozen or so of others who are dissatisfied with their jobs and ready to quit. As to expecting one or two individuals to get a raise and keep quiet about it, such things seldom happen, for as a rule, when a workman gets a raise he delights in telling his fellows about it and telling them what poor fish they are not to get one too.

As to giving advance notice of a lay-off, I believe this is customary with most firms when business conditions are such that a lay-off can be foreseen. Advance pay is another thing, for a lay-off usually indicates the necessity for curtailing expenses, and the payroll being the largest item of expense, not many firms would consider it wise to make further inroads upon their resources.

During the past years, few employees gave their employers any advance notice of their intention to quit. The right to leave their jobs without notice has been one of the many privileges of which the employees have taken full advantage.

In regard to the data furnished by applicants for jobs to substantiate their claims, I do not take much stock in it. During the war period, there has been developed many single-purpose men, some of whom have acquired a considerable degree of proficiency upon—let us say—shell-lathes, and perhaps made big wages as operators of such lathes, but as all-round mechanics they are not there; yet rarely is their vision such that they can see why wide experience is more valuable than single-purpose efficiency.

I think that whenever it is practicable to do so, the "show-me-what-you-can-do" idea should be put into practice before setting a value on the applicant's ability. This is the one certain way of recognizing and appraising experience.

In our shop we aim to follow this method. We explain to a new man our organization, our product, what our trade name stands for, and all the advantages that will be his if he will join us. We introduce him to all with whom he will come in immediate contact, and our employment superintendent keeps in touch with him for the first few weeks to see how he is getting on. If he is a reliable man and wants steady work he will stick; if he is a floater, two or three weeks will show him up and he floats off to another job—usually without notice.

These few remarks represent the opinion of one foreman: Let's hear from some more.

# Standardization and the Safety Movement

By CHAS. E. OAKES and J. A. DICKINSON

*No other field in American industry offers greater possibilities for intelligent standardization work than that of safety codes for use by various states, municipalities and insurance companies. Of the value of standardization there is ample evidence.*

THE standardization program adopted by the War Department made possible the enormous output of munitions during the war. The choice of standard side-arms, capable of using a universal cartridge, strikingly illustrates the beneficial effects of standardization. At the time America entered the war there were two types of pistols in use in the army—the Colt 0.45 Automatic and the regulation 0.45 revolver, generally referred to as a "six-shooter," each requiring a special cartridge. This latter type was manufactured in two models, the 0.45-caliber Smith & Wesson and the Colt 0.45. By providing a clip which would hold the rimless automatic cartridge in the ordinary revolver it was possible to use one type of cartridge in the three guns. Germany with all her vaunted efficiency had no less than twenty-two different makes and calibers of revolvers and automatics in use by her army, the calibers ranging from 0.22 to 0.56. The result was that an extremely large stock of various-sized cartridges had to be kept on hand; otherwise a large proportion of their side-arms would have been useless.

The War Department also standardized heavier guns, shells, fuses and detonators as well as hundreds of the articles used by the American forces. In the case of dry batteries the War Department selected, as a result of a series of tests by the U. S. Bureau of Standards, seven types from the hundreds of sizes and shapes on the market, and standardized them for use abroad. In practically every field of manufacturing endeavor this standardization work was carried on, chiefly through the medium of the War Industries Board.

## Peace-Time Value of Standardization

Prior to the World War the automobile manufacturers, through the Society of Automotive Engineers, had done some very remarkable standardization work, and it is largely through their efforts that America leads the world in the production of low- and medium-priced cars. In the electrical field the larger manufacturers have standardized certain definite types of machines, and by producing such standardized types in large quantities they have been able to reduce materially the price of electrical machinery without any reduction in the quality. Nearly every branch of industry today has a manufacturers' association and almost invariably these associations are working toward a uniform product, standardized to meet the needs of the market.

At the present time there is a woeful lack of uniformity in the safety rules and regulations in general use. This very lack of uniformity is doing much to hinder the ultimate safeguarding of industrial plants. Where the requirements of the city, the state and the insurance companies differ widely and each interest is seeking to enforce its own particular set of standards, it is to be expected that the manufacturer will hesitate to carry out an extensive and comprehensive plan of safeguarding when he has no assurance that such safeguarding will ultimately meet the demands of all of the authorities concerned.

## Lack of Uniformity a Drawback

This lack of uniformity is a great drawback in the purchasing of some kinds of machinery in large quantities. Let us take a hypothetical case. A manufacturer with branch factories in twenty different states finds that on account of the growth of his plants it will be necessary to install additional elevators in a number of them. If he were able to place an order for all the elevators needed, all to be of one type, differing perhaps in platform size and capacity, but with standard safety devices, hoistway inclosure, cables, sheaves, etc., in all probability he would be able to purchase them at a considerable reduction. While present conditions hold, however, an elevator that will pass the requirements in one state will in all probability not be satisfactory in another, and the requirements of each code must be carefully studied in order to meet the requirements of the particular locality in which each elevator is to be installed.

As an example of the great value of a national code, the A. S. M. E. Boiler Code might be cited. It is being rapidly adopted by various states and cities and a boiler built according to the A. S. M. E. specifications is standard anywhere in the country. Many of the boiler manufacturers who at the time of the writing of the code opposed certain more or less stringent clauses, are now glad to advertise that their boilers meet the A. S. M. E. specifications. Similar improvement in types of apparatus and methods of construction have resulted from a widespread use of the National Electrical Safety Code and the National Electrical Code published by the Fire Underwriters.

## The Logical Place to Install Safety Devices

The logical place to install safety devices on a machine is in the factory where it is built. Many manufacturers, notably in machine and wood-working lines, have done excellent work toward guarding gears and cutters, but until there is a uniform set of standards there is little hope of this work being carried much further, as the details of the requirements in the various states still differ widely. If a series of national codes were to be adopted the manufacturer of machinery could build a machine which would meet the requirements of any state in the union, and in all probability would be glad to build and advertise such "national standard machines" just as the boiler manufacturers are advertising the "A. S. M. E. Standard" boilers.

One step in the right direction has already been made by the various casualty insurance companies in the formation of compensation service bureaus and rat-

ing boards. By adopting a uniform rating schedule and allowing premium credits for installation of safeguards, such bodies have done much to promote the adoption and use of safety devices throughout the country. Many manufacturers, unfortunately, can be appealed to only on the "dollars and cents" basis. Such standards as have been drawn up by the rating boards and bureaus have quite naturally been drawn up primarily with a view to hazards as viewed from an insurance standpoint. Unfortunately, there has been no concerted effort made to standardize the various state laws and bring them and the insurance requirements into harmony. When this most desirable move has been made the effect will undoubtedly be noticeable immediately, and not only will there be a large increase in the amount of guarding done in various plants, but there will doubtless follow a marked increase in the amount of guarding done by the manufacturers of machines. Furthermore, if all the various organizations concerned can be led to take part in drawing up uniform specifications, their participation in the work will undoubtedly stir up and foster a much greater interest in safety work throughout the country than there has been heretofore.

### Relation of Standardization to Conditions of Employment

Entirely aside from the humanitarian aspect of a move to secure national safety standards, with the resulting increased installations of guards, the fact that the nation at large is alive to industrial hazards and is making a strong concerted effort to better conditions through standardization, should go far to aid in the bettering of relations between employer and employee. The careful study which has been given to the problems of methods of employment of labor, welfare of workers, rehabilitation of crippled workmen, etc., by some large industrial concerns has materially assisted in developing a friendly feeling on the part of their employees, and an evident effort to provide all practicable safeguards for workmen should likewise help in creating good feeling. The fact that representatives of the various labor organizations are not only consulted but are actually assisting in the formulation of safety standards should have considerable effect in advancing better understanding between employee and employer and should go far to convince workmen that, from the standpoint of the industrial worker, conditions are being improved with respect to safety.

### Fundamental Principles as Bases for Codes

In order that a national safety code may be generally adopted it is necessary that it be prepared by a carefully chosen committee of trained men representing all important interests. Upon such a committee manufacturers, state authorities, municipal authorities, insurance companies and labor interests should each be given equitable representation. The committee should submit the tentative drafts of such a code to as many interests as possible, due consideration being given to their criticisms and suggestions. The working together of such a committee would probably be of considerable benefit to the interests represented aside from the code drawn up by them.

Unlike the standards of length, weight and measure which are fixed and unchangeable, a safety code, which is really a standard of practice, must be a live, and to a certain extent, a flexible instrument. It must not hamper or hinder the development of new or improved processes, nor should the provisions of such a code interfere with the production of work on machines which they cover. It will be necessary to take into account the fact that not all the manufacturing plants of any one industry are confined to a single community Frequently, there are local conditions in one plant that will not be found in a plant a few hundred miles away which is making an identical product. The processes in both plants may be satisfactory from the standpoint of safety and yet differ considerably in detail and method of application. It is apparent, therefore, that while the standard must be fundamental and explicit, at the same time it must possess a flexibility that will meet the varying needs of widely divergent plants operating under an extremely wide range of local conditions.

The vast majority of operations now carried on in our manufacturing establishments utilizes machines of special design or process which are peculiar to the industry. Radical re-designs made from the viewpoint of safety may increase the cost of operation or the initial cost of the machine to such an extent as to be prohibitive. The increased cost of operation may be evidenced in a decreased production or the necessity of additional attendants. Unless the hazard is so great that an immediate and radical change in design is necessary a large expenditure to obtain the greatest degree of safety may not be warranted. A standard should not place too great a burden on the industry either in the cost of operation or in the first cost of a machine.

It is needless to say that the worker should be relieved of undue fatigue, and the evolution of industry has operated in this direction. It is a noteworthy fact that new types of machines in all lines of industry have been more efficient and at the same time usually offer less hazard and are less fatiguing to the worker than machines of older types. A uniform standard safety code will open the way for still better and safer machines. Then and only then can the real educational work of accident prevention be fully carried out.

With a well-guarded plant the owner can say: "We've done our part. Guards will prevent only a certain percentage of accidents; the elimination of the rest is up to you." The hearty co-operation of the workmen can be obtained and a worthwhile concerted effort inaugurated toward making the plant safe in its fullest and truest sense.

In view of the conditions which have been outlined, is it not high time that at least a beginning be made on the formulation of safety codes suitable for use in all parts of the country? And is there a better procedure possible than to have this work done under the auspices of such a representative committee as has been suggested above? Naturally, men from different sections of the country and in different relations to the industries will have different opinions regarding the general requirements which should be established; but no better way of disseminating the valuable results of experience or of combatting ideas of doubtful value can be found than to bring the advocates and opponents of each requirement face to face for discussion. By such full consideration with all interests represented it should be practicable to produce codes which would be acceptable both to insurance and to State and city regulatory authorities, and which would gain the great advantages of uniformity of practice without blocking development and improvement in any industry.

FROM time to time attention is called to educational moving pictures which have been prepared by different firms for the benefit of their employees, or for sales purposes. The majority of these are of local interest only and, serving a limited purpose, are of no general value; but there are subjects in the machining field which can be, and should be, so covered that the benefits of a film presentation will be general.

A short time ago the writer was privileged to witness the presentation of a moving picture film of mechanical interest before an audience of shop-men, everyone of whom appeared thoroughly interested and without doubt derived considerable benefit therefrom. The name of the film story was "The Use and Abuse of the Twist Drill," which picture has been produced by the Cleveland Twist Drill Co., Cleveland, Ohio. It was originally only two reels in length, but its success has encouraged the producer to add first a third and later a fourth reel.

By J. V. HUNTER,
Western Editor, *American Machinist*

*This article tells of a moving picture which has been put out by a large twist-drill producer in order to inform the users of its products as to the correct methods of handling them. The chief points brought out in the moving picture are shown by the accompanying series of cuts, which should prove of value for reference purposes.*

Although this work has been produced without advertising features, it is furnished free of charge to those who will have it shown in their shops for the benefit of their workmen, the only stipulation being that, for the sake of safety, a licensed cinema operator be employed. Some mention has been made of the film in the columns of the various technical journals during the past few months, but it does not seem that every one has the proper conception of its purpose; and perhaps it may be said that it has not been press-agented in the manner that it deserves, although it seems to be well dated-up and to be playing to full houses.

### The Instruction of Mechanics

There are probably few shops in the metal-working field where the twist drill does not constitute an important part of the tool equipment. The maintenance of an adequate stock of high-speed twist drills is today a considerable item of expense, and yet it will probably be found in most shops that the greater portion of the life of the drill is destroyed by unintelligent use by the mechanic or by wasteful grinding away in sharpening. The stoppage of such sources of loss can be effected only by intelligent instruction in the use and care of the tool.

How many shop managers can say with knowledge that their foremen are giving adequate instruction of this character to each of the workmen under their supervision? Usually the foreman today is so loaded with troubles relating to production that he thinks only experienced mechanics should be furnished for his service, and he is losing the role of instructor, which he was once supposed to occupy. No mechanic trained in the old school of apprenticeship can say that he learned all there is to know about a twist drill in one day, nor even in the many days that he had occasion to use a drill. Most of his information was acquired by experience; and even when that meant a spoiled hole and a ruined piece of work or a broken drill, the "bawling out" which he received from the foreman rarely served to give him the information necessary to avoid a repetition of the same trouble at a later date. It has been for some time one of the main principles upon which modern educational methods are founded, that the human mind can be more rapidly instructed through actual examples shown to the eye than it can absorb the same knowledge through precepts either spoken or read. Most men in executive work in the shops have learned this same principle by actual experience, and have found that directions given by spoken word to the workman regarding the form or condition of work to be done on any mechanical device is far better understood if supplemented by even the rudest form of pencil sketch, thus constituting a form of visual instruction.

We have lately learned that the same methods of schooling should be applied to make proper mechanics that are used in training scholars in the public schools. This has brought about the establishment of training schools in some of the larger industrial plants where, with the proper methods of "forced feeding" of mechanical training, fairly good mechanics can be produced in a few weeks.

It is a forward step in this educational development to teach a mechanic the proper handling of a twist drill by a moving picture. To learn these points by the regular slow shop methods of experience is a very expensive one for the employer. Many dollars may be quickly lost through a little ignorance which leads to the breakage of a few large high-speed drills; and when this is multiplied by the many different ways in which drill troubles can occur, and multiplied again by the number of green hands which are being broken into the work each day, the advantage of using this educational opportunity should be quickly seen.

Fig. 1. Insufficient lip clearance has caused the drill to "drag at the heel"

Fig. 2. Lack of lip clearance near the center caused the point to crack and chip out

Fig. 3. Running a drill at high speed without sufficient lip clearance at the point caused the drill to split

Fig. 4. Too much lip clearance left the cutting edge so thin that it burned away on the outer corners

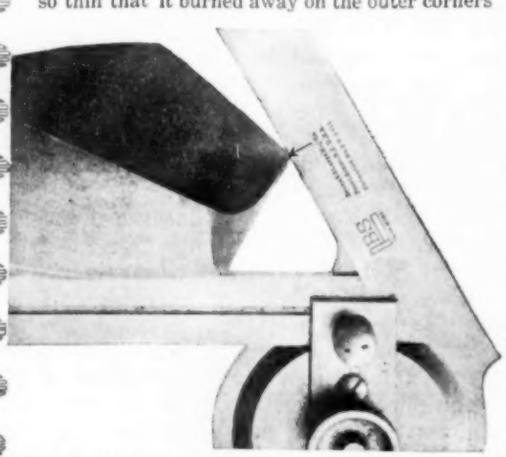


Fig. 5. Grinding with more angle on one cutting edge than the other causes it to drill too large a hole

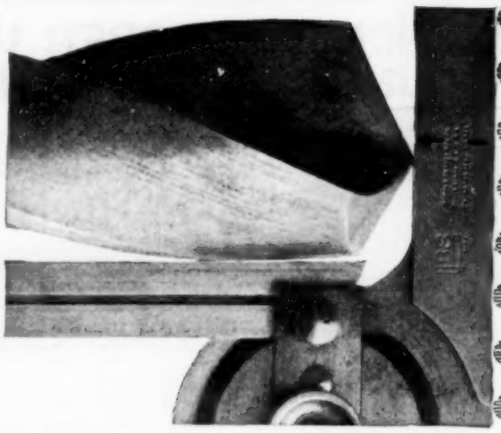


Fig. 6. Equal angles on the cutting edge, but point is off center, also making it drill an over-size hole

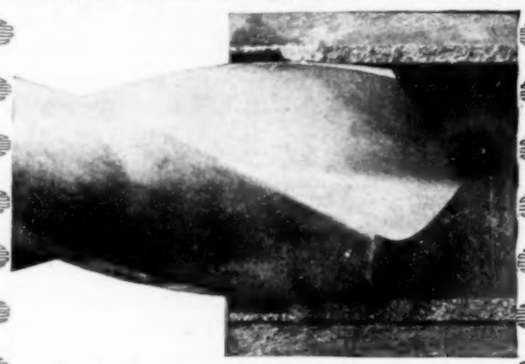


Fig. 7. Lower portion shows hole made by a correctly-ground drill

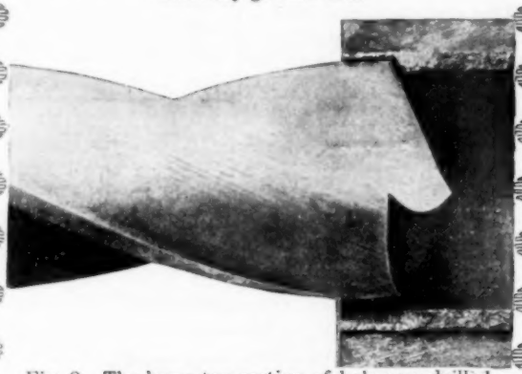


Fig. 8. The large top section of hole was drilled with an incorrectly-ground drill of same size as used for lower portion

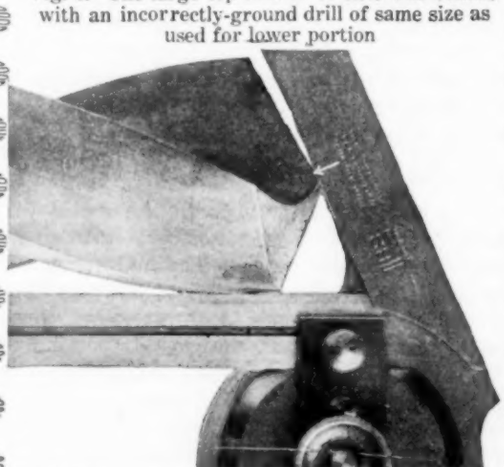


Fig. 9. Incorrect grinding can double the trouble by throwing point out of center and making cutting angles unequal

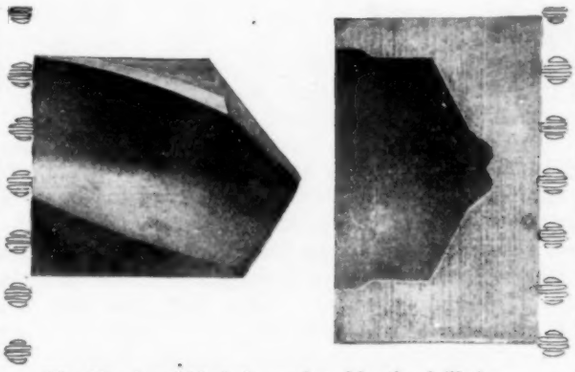


Fig. 10. A wabbly hole produced by the drill shown in No. 9. The long lip is cutting a larger hole

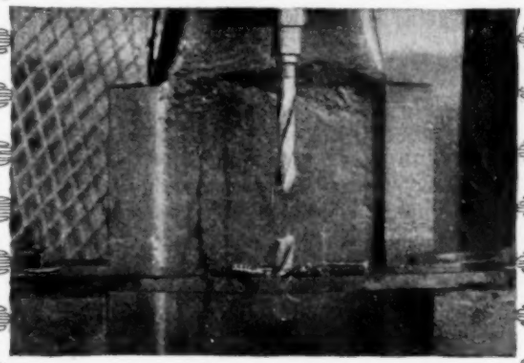


Fig. 11. Drilling without properly supporting work. This binds and breaks drill

Fig. 12. Drilling with too much feed and insufficient speed chips the cutting edges

Fig. 13. Too much speed causes the outer corners of cutting edges to wear away more rapidly than any other portions

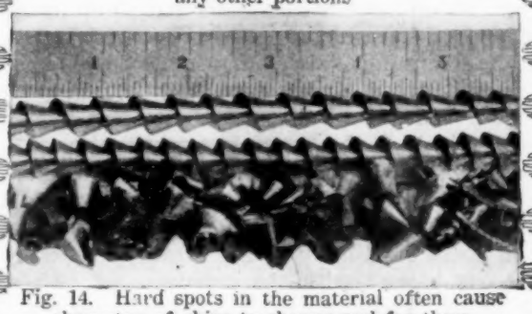


Fig. 14. Hard spots in the material often cause character of chips to change and for these conditions the feed and speed should be changed

Fig. 15. A drill properly ground produces uniform chips

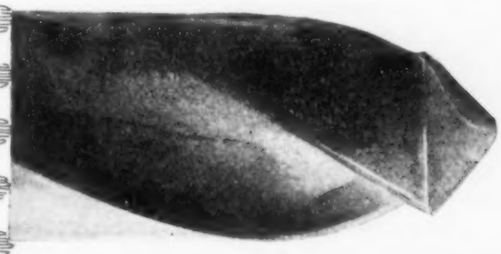


Fig. 16. Blunt point, due to pounding with hard hammer, causes drill to require greater pressure while drilling

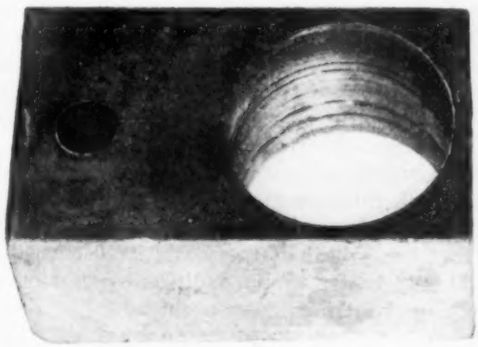


Fig. 17. Rough holes are caused by dull drills. Sharpening drills will often save a reaming operation

Fig. 18. Poor sockets are caused by abuse and use of improper drift pins. These cause drill breakage and inaccurate holes

# The Ship of State*

By ELBERT H. GARY
President, American Iron and Steel Institute

IN THIS presence it may be asserted, without thought of contradiction, our country is the best of all.

"As frequently stated, notwithstanding the United States has only 6 per cent of the world's population and 7 per cent of the world's land, yet we produce:

20 per cent of the world's supply of gold.
25 per cent of the world's supply of wheat.
40 per cent of the world's supply of iron and steel.
40 per cent of the world's supply of lead.
40 per cent of the world's supply of silver.
50 per cent of the world's supply of zinc.
52 per cent of the world's supply of coal.
60 per cent of the world's supply of aluminum.
60 per cent of the world's supply of copper.
60 per cent of the world's supply of cotton.
66 per cent of the world's supply of oil.
75 per cent of the world's supply of corn.
85 per cent of the world's supply of automobiles.

"Better still, we have constitutional freedom; protection of life, liberty and property. If, in any respect, these principles are violated, it is by individuals and not by sanction of fundamental laws. As one becomes familiar with the Constitution and with all departments created by it, one is convinced that the scheme and philosophy of the framers was to guarantee equal protection and opportunity to all the people. With the preservation and functioning of the Government in accordance with the letter and spirit of the Constitution there is offered peace and protection; with disregard or violation of any material part of it there is, *pro tanto*, suffering, distress and ruin.

"Possessed of these natural resources and opportunities a moral, intelligent and industrious people have reached the first place in worthy achievement. Hence, persons from every part of the world have come to the United States to better their condition by participating in the blessings which are here provided. For no other reason, except an intention to wantonly attack, destroy and forcibly appropriate, would foreigners settle in our midst.

"The great majority of immigrants have come with pure motives. They have been welcomed by their predecessors and eagerly and gladly have become a part of the mass of loyal and deserving citizens. We have approximately one hundred and ten millions of inhabitants, and, as a whole, they rank high in the world's throngs of human beings.

"However, we need not close our eyes and ears to the utterances of learned men in editorials, lectures, public addresses and private speech, to the effect that even our Government itself is threatened at the present time; that for some months there has been and still is being carried on propaganda, instigated and controlled by vicious men, mostly foreigners, which tends to create a feeling of unrest, dissatisfaction and antagonisms. Appeal is made to the cupidity, the selfishness and the baser instincts of men. Promises not possible of fulfillment are made; sometimes threats and intimidations are indulged in.

"Human nature, weak and greedy, is easily affected. The minds of considerable numbers, due to war conditions, resulting in privation, suffering and misery in some cases and temporary possession of unusual funds in others, are abnormal, and false and wicked doctrines are apt to find lodgment. Advantage has been taken of these natural tendencies by unprincipled men, some of them really enemies of the United States, others merely demagogues, all actuated by the desire to promote personal gain. Numbers of men who are loyal Americans, some giving evil advice and others lending receptive ears, will hereafter entertain feelings of regret and shame for their part in the public discussions of today.

"The present so-called labor strikes, involving riot and injury to property and person, are instigated as a part of the campaign to disturb and demoralize the social and economic conditions of the country. In other lands very serious results have been accomplished by the same means which have been employed here.

"Is the disease of unjustified unrest and revolt now discernible progressive? Will large numbers of our population be influenced? Is the Ship of State in danger? Is she headed for the rocks? Is there a possibility of increasing storms to a degree which would drive her to destruction?

"The answers depend upon the conduct and efforts of the sailors themselves, and they include all classes of people. The word 'class' is not used in an invidious sense. There are no classes in the United States such as have existed in other countries. Formerly, in certain parts of the world, classes were actually formed and sustained by the rich or powerful, who were supposed to belong to the 'upper class.' They became distinct and commanding. They secured and continued to hold additional privileges and benefits to which they were not justly entitled, and which made them proud and overbearing. They were doomed to eventual failure and final destruction, except so far as they might be deserving on the merits. In America those who now seek to establish classes and to secure discriminating favors for themselves are not prominent because of wealth; they are composed of a comparatively small minority of the population who have adopted the word 'labor,' which signifies honorable activity, with the concealed design of forming a 'class' which they hope will finally attract a majority of the people, and thus enable them to obtain one legislative act after another until the Constitution shall be undermined and the whole structure destroyed.

"These men have already secured certain legislation which is wrongfully discriminating. Some of them know what the final consequence of their designs must be; that all would be lost in the ruins; but immediate personal gain is to them sufficient justification.

"The safe, efficacious and natural remedy for the perils which have been hinted at is to be found only in unity of purpose and effort on the part of the whole crew on board our Ship of State, which includes everyone who is blessed with the privileges of citizenship in the United States; an undivided loyalty to the principles of our Constitution and all the laws which are

*Address delivered at annual meeting, Hotel Commodore, New York City, May 28, 1920.

passed in conformity to it. This will eliminate from the social structure the vicious elements. Sad to say, there is not at present, nor has been in the past, perfect harmony of action between the masses of the people.

"Without dispute, any person has his or her place, rights and privileges. This includes those which are personal, private and exclusive. No one may properly impinge upon the rights of another. Everyone must be protected to the full limit of the laws which are intended for the benefit of all, with the understanding that private interests are subordinated to the public welfare; but in the exercise of individual rights, in the protection of individual property and interests, it is the obligation, as it should be the pleasure, of everyone to act without animosity toward the Constitution, the laws, and the general public, and without improper and unnecessary friction.

"In a discussion of this kind there should be a frank admission that no one is without fault; that every variety of human nature may justly be censured. And for purposes of illustration, we may refer to groups of persons and interests. We could not accurately speak of them as classes; but these groups might be, and heretofore have been, mentioned as the capitalistic group (including their representatives), the labor group, and the general public. Slight effort at analysis will demonstrate how far short of accuracy these descriptions are.

"Who compose the first? Those who have accumulated property; if so, how much?

"Who make up the second? Those who work with their hands; if so, with the shovel, the lever of a machine or the pen?

"Who constitute the third? Those who neither possess pecuniary resources nor perform any labor? If so, there is none to be considered in this connection, for the group would be small in numbers and subjects of charity or public control. Obviously, the public is made up of the entire population.

"And yet, we can comprehend to some extent what is in the minds of some of the writers and speakers who undertake to make these classifications to which I have alluded.

### Employers

"I will, for present purposes, place the members of this large audience in the first group. Most of you are possessed of accumulated savings and occupy important positions, although you started from the lowest rung of the ladder of success, and because of merit and hard work have reached your present station in life. You have, in management, in greater or less degree, marked responsibilities in regard to each and all of the groups described. You could not shirk or minimize them if you desired to do so. As a business citizen you must account to others for your stewardship. What you say, what you do, will have an important influence in national, even international, affairs. It will be good or bad. You must consistently observe the principles of the Constitution, the provisions of the laws of the land, the rights and interests of your neighbors, including your employees, customers, competitors and the general public. You must be unselfish, reasonable, fair, sincere and honest. You should, without interruption, give evidence of a disposition to conciliate and co-operate. Regardless of the past, even though you may believe you have been unjustly treated or censured, you should and will make and keep resolutions for the future which you know are proper. All this, of course, applies with full force to your President.

"If we adhere firmly to these principles, if we are steadfast and true; and then courageously, though modestly, proclaim our rights and insist upon proper consideration in return it will be accorded. We have heretofore been somewhat backward in this respect.

### Employees

"Employees generally are included in the second group. With all others they have full and equal rights and responsibilities. They must and will realize that their advancement and contentment depend upon the progress and prosperity of the employers; that, except for the willing and free investment of capital up to the requirements of business demands, together with full co-operative assistance on the part of the best talent, enterprise and initiative would languish and disappear and that indifference and idleness would be substituted.

"Agitators who are trying to create trouble between employees and their employers as a rule are insincere and selfish. Generally, they, themselves, have performed no hard labor, nor had experience which qualifies them to lead or instruct. They strive for personal popularity and gain. Their business is better, their compensation increased, when others are in trouble. Assuming to be sympathetic and superior in intelligence, they mislead and often misrepresent. They promise reforms, but their methods lead to trouble and loss to others. In this list are included a few writers, lecturers, public speakers and self-appointed labor leaders, so called.

"The great masses of employees, if left to decide for themselves, are loyal to the country, to the public interest and to their employers; and to the extent of this loyalty they will be rewarded up to the full measure of their deserts. This they will have the right to demand; and it will be readily and cheerfully accorded. They also should, and they will, continuously exercise a disposition to conciliate and co-operate. As applied to all groups, faithful performance, and this only, will insure highest pecuniary results and most liberal treatment.

"We sometimes hear a man claim that the world, or the nation or the public owes him a living. This is foolish and preposterous. There is due every citizen of this country no more and no less than the same opportunity to procure a living that is accorded any other. This is the full measure of fairness and justice. The state cannot furnish to the individual natural ability or disposition. The honest man who reads, studies, thinks, works, economizes, saves, persists and uses his best judgment will succeed in this country. If he is neglectful, indolent, profligate and dishonest, he will fail. A large majority of the men of the United States who have become prominent in statesmanship, finance, professional or business life, started from an humble beginning; and, by their own endeavor, have advanced. Ordinarily, the men who complain because of their poverty or position in life have only themselves to blame. There are exceptions, such as those who are naturally or otherwise disabled at birth or later, and they are entitled to and do receive public assistance; but, as a rule, those who do not prosper are indifferent to worthy accomplishment, or partly so. In every department of life in this country, in the mill, the shop, the store, the bank, the office, the profession, the schools,

one may, so far as opportunity is concerned, start at the bottom, and, by his own energy and faithfulness, progress even to the top. We who are present on this occasion know, by experience, this is true. Any concern, any organization, any government which seeks to promote, demote, or retain a man in position contrary to his just deserts, combats the public interest, the life and growth of the nation; and more than this, is perpetrating an incalculable injury to the man himself.

THE PUBLIC

"In the classification suggested, the public comprehends every citizen except the individual who is discussing the subject. Speaking of men we can define interest only as either public or private. Depending upon the question under consideration, we may embrace in the word 'public' a community, a village, city, county, commonwealth or nation; but the question comes back to either public or private interest.

"As each individual in the groups heretofore mentioned is obligated to conduct himself or herself in such manner as to promote and not impair the public welfare, so the public is likewise responsible to the individual. In public discussions, and occasionally in newspaper editorials, it is frequently assumed that there is no corresponding and reciprocal duty on the part of the general public whom, at the particular time, the speaker or writer attempts to represent. Unjust attacks or criticisms against individual interests, sometimes promiscuous, in other instances by name, are made from a biased standpoint or upon distortion of the facts. The exact truth is not infrequently ignored or overlooked. Many able discourses in the press, in the Congress of the United States, by public officials, even from the pulpit, are based on a misstatement of the facts. Those possessed of least ability from experience or otherwise are most pronounced in abuse or misrepresentation. It sometimes seems apparent that persons indulging in harsh criticisms purposely avoid ascertaining the truth which is easily obtainable. A proposed assertion that might seem to be effective in popularizing the speaker or influencing the poorly advised, would be withheld if previous inquiry were made as to the truth.

"The speakers or writers who are recklessly unjust are rare exceptions. But for this reason, if for no other, they perhaps receive more extended notice. And they are a part of the general public and from that viewpoint claim to prepare and deliver their dissertations.

"The volunteer guardians of the public welfare and of private individuals and interests are numerous and audacious. They wrap about themselves the cloak of self-righteousness and proclaim from the housetops. The public has a duty to perform in exposing and controverting hypocrisy and sham on the part of the reckless and irresponsible. In its own interest it is bound to protect private property, private business and capital, and of course, most of all, them that are least capable of caring for themselves.

"Every individual should under all circumstances receive from all others honest and fair consideration. There should not be, there must not be, any discrimination against or in favor of any particular group of persons if this country is to retain the position among the nations to which it is justly entitled.

"The general public, whether it is represented by governmental heads, by Congress or otherwise, should cooperate with and assist private enterprise. Every department of government has responsibilities and opportunities of magnitude at this particular period in our history, remembering that general prosperity is the first essential.

"They can do much toward the preservation or destruction of the Ship of State. They can by precept and example contribute in rehabilitating and re-establishing the affairs of this country. For constructive statesmanship, which will add to stability and progress in the moral, economic, social and political life of the nation, they will be entitled to the commendation of all mankind; while by a narrow-minded, partisan, fault-finding, destructive policy, they will create discord, distress and demoralization. The majority of the people of this country are tired of petty animosities, of unreasonable rewards or punishments, of undue restrictions or liberality concerning public or private undertakings. They are disgusted with muckracking, which usually is conducted for the glorification of the inquisitor and at a large expense to the public. This is especially true of the present, when sentiment is inflamed and when the burdens of taxation are almost intolerable.

"A word concerning the next President—the Captain of the Ship of State. There must be selected one who is able, wise and well-informed, of unquestioned honesty, morally and intellectually, eminently fair and impartial, frank and sincere, broad-minded, deeply sympathetic, courageous, sturdy and well balanced; and above everything else, loyal to the Constitution and the laws of the land.

"Other problems of magnitude, national and international, engage our attention at the present time, but those of highest importance relate to the life and safety of our Ship of State.

CONCLUSION

"We have reason to expect, and I firmly believe, that now and henceforth, more than ever before in our history, a spirit of unity will pervade and control the minds of all the citizens from the President down; that each one will recognize a personal responsibility to his country and to all its inhabitants; that strictest economy in expenditures and management, lowest costs, and proper compensation for faithful performance will be the universal sentiment; and that order, stability, advancement and prosperity will surely follow."

## Use of Cross-Section Paper in Making Charts

BY JOHNSON BARR

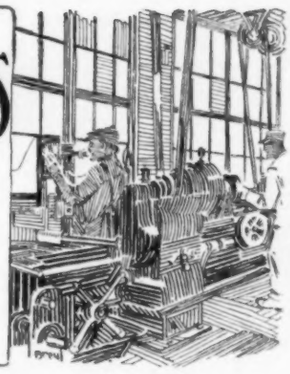
In making up charts on tracing cloth which has been previously ruled up into proper columns, it was formerly our custom to rule guide lines in pencil to keep the figures in alignment.

This proved to be a slow and tedious job—especially in making up large charts—and in order to overcome this we hit on the scheme of first ruling up the chart in its proper columns, and then laying it down on a sheet of cross-section paper. The lines on this paper showed through the tracing cloth and it was an easy matter to follow them in adding the figures.

This stunt may be old to some but was new to us, and did away very effectively with the old tiresome ruling of pencil guide lines, so I am passing it along to you for what it is worth.

# MODERN PRODUCTION METHODS

By
W. P. Basset
of
Miller, Franklin, Basset & Co



IN the first article of this series it was stated that there were two main phases to planning production; the preliminary building of a smooth road to facilitate the later movement of work; and the day by day planning by means of which the individual parts of an order are made to move regularly down this road.

We have completed the discussion of the preliminary work and are now ready to see how a specific order is handled in the office and shop. We have seen in the foregoing articles:

1. How purchasing is handled.
2. How stock is kept and controlled.
3. How the product is engineered.
4. How tools are provided and kept.
5. How the shop is put into balance.

## VII. The Central Control of Production

*In order to manufacture machines economically the various parts should reach the assembly floor at the proper time and to this end it is necessary that they be at all times controlled, from the purchase and delivery of the raw material, to the time they reach the assembly floor. This means planning—not letting "George do it"—or the assembly department will get excuses instead of finished parts.*

(*Part VI was published in our June 17 issue.*)

The movement of work in an unplanned shop has always reminded me of a disorderly mob, lunging first one way and then another way, without precision or apparent aim. The purpose of planning is, of course, to get the work to move smoothly and regularly in a definite direction and at an eccelerated speed. Hence the first step is to organize the mob of parts into an army, comprising units of a definite size. That is, we divide all work up into lots and combine the lots into series. The effect is comparable to that of organizing a mob of uncontrolled Bolsheviki into companies and regiments of soldiers, which can be made subject to control.

The size of a lot must be settled for each part. The general rule is to make the lot of such size that it can go through the average operation in not more than one day. This must be tempered by the size and weight of the part, for the lot should travel as one piece and it should take a great emergency to warrant splitting it.

So that each lot may easily be moved as a unit, it is well to design the trucks so that each will hold one complete lot. In the plant of the Warner Gear Co., for instance, it was possible to design three styles of trucks which handle 90 per cent of the parts. All three types are of wood, mounted on casters and so constructed that for long moves they may be picked up and carried by an electric lift truck. Each has a receptacle for the traveller form.

The dimensions of all three trucks are the same—26 x 36 in. and 44 in. high. In one truck a series of holes is provided to hold such parts as shafts with gears attached; another is provided with pegs upon which gears with holes can be hung; another consists only of shelves to hold such pieces as straight shafts, levers and so on.

To see how the work is scheduled and controlled from the central planning office, let us follow the course of an order from the time the sales department gets it. We have seen in article IV how the engineering department notifies the production department on Fig. 15, the parts list, what parts must be made for any assembly.

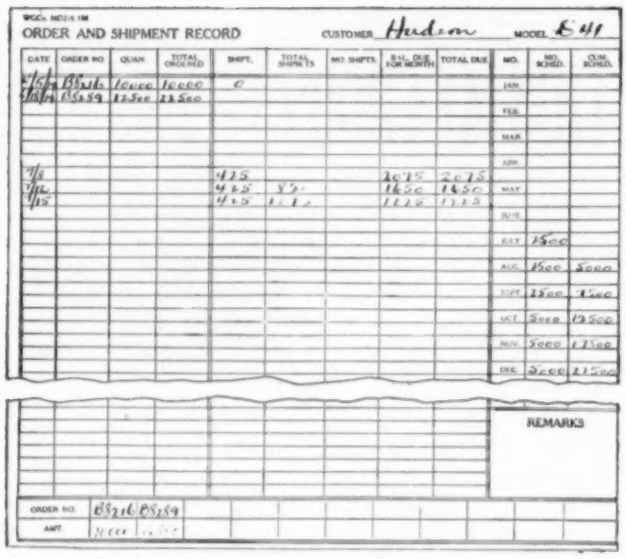
This form with the sales order, which gives the delivery specifications, serves as the basis for planning the work by the central planning department.

Our example is taken from a highly complete planning system in a shop which has, under normal circumstances, the advantage of knowing what to make and deliveries specified for at least three months in advance of delivery. When delivery cannot be ascertained from customers' specifications, it becomes a function of the general manager and sales manager to release for manufacture a sufficient quantity of product to keep the shop up to any capacity which has been previously decided upon.

The planning department then goes ahead as if this release were a real sales order. The planning department now posts the story as shown by the sales order onto the "order and shipment record," Fig. 30, this record being headed with the name of the customer and the name of the model which he is purchasing. This form is self-explanatory, it is simply a bird's-eye-view of the obligations to the customer and how well these obligations are being met.

We are now ready to post—guided, of course, by the bill of material—to the "production stock and demand record," which was shown as Fig. 12 in article III. This form is truly the "production man's bible." We mentioned this form rather casually when discussing stock keeping. A careful study of it will now be well worth the reader's time.

This record provides a sheet for each part. It is a comprehensive picture of the condition at any time of each item of raw material needed, for it shows not only what is needed, but how fast the stock comes in and


ORDER AND SHIPMENT RECORD

CUSTOMER Hudson MODEL D 41

| DATE | ORDER NO. | QUAN. | TOTAL ORDERED | SHPT. | TOTAL SHIPTS | NO. SHIPTS. | BAL. DUE FOR MONTH | TOTAL DUE |
|---|---|---|---|---|---|---|---|---|
| 4/1 | B5216 | 10000 | 10000 | 0 | | | | |
| 4/15 | B5259 | 12500 | 22500 | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| 7/5 | | | | 425 | | | 2075 | 2075 |
| 7/12 | | | | 425 | 850 | | 1650 | 1650 |
| 7/19 | | | | 425 | 1275 | | 1225 | 1225 |

| NO. | NO. BOXED | CUM. BOXED |
|---|---|---|
| JAN. | | |
| FEB. | | |
| MAR. | | |
| APR. | | |
| MAY | | |
| JUNE | | |
| JULY | 1500 | |
| AUG. | 1500 | 3000 |
| SEPT. | 2500 | 5500 |
| OCT. | 3000 | 8500 |
| NOV. | 3000 | 11500 |
| DEC. | 3000 | 14500 |

REMARKS

ORDER NO. B5216 B5259

ART. D41

FIG. 30. ORDER AND SHIPMENT RECORD

exactly how much stock is in the plant at any time, after considering receipts, shipments, reclaimed spoilage and all.

One of the chief difficulties in planning production comes from lack of knowledge concerning the disposition of rejected pieces, that is, pieces which may either have to be scrapped, or which may be reclaimed by re-operation. This may cause over-production, over-purchasing and trouble in assembling, due to pieces delayed in passing through the plant.

As the production department posts on this record the delivery specifications, it notes on the parts list, Fig. 15 (part IV) against each part, the standing of the stock available for that order. One copy of the parts list goes to the purchasing department, which contracts for the required material, the delivery dates to be specified later.

Let us assume that an order for, say, 10,000 transmissions comes in April and that the first delivery date is in July. We have seen that certain parts of the assembly will have to be put into manufacture at an earlier date than others.

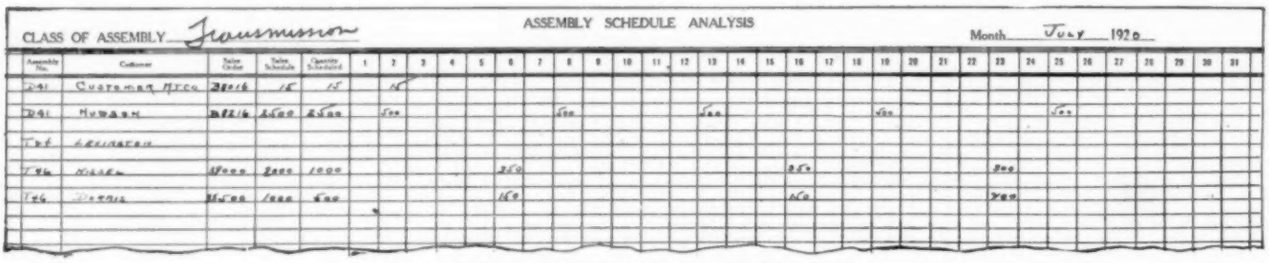
Why not start all the parts on the same day? Because that would tie up needlessly a large amount of capital in work in process and finished stores. To avoid this we must determine the date on which we should start to manufacture the various parts to insure their simultaneous arrival on the assembly floor. This is one of the most important parts of planning. Otherwise production must be started from assembly floor shortages—which is like locking the stable door after the horse has been stolen. Unless the need for each part at a certain time is foreseen, the production man's time each day is occupied in straightening out the trouble he got into yesterday. It is not only easier, but cheaper and better all around to look ahead and avoid production troubles before they come.

If this order was the only order in the plant, scheduling it would not be so complicated. But as a rule it is necessary to sandwich an order in between several other orders from other customers for the same and different models, which are already in the shop.

Now, no manufacturer likes to receive his shipments all on the first day, nor yet all on the last day of the month.

The automobile manufacturer especially prefers to have his transmissions, say, come to him a few at a time, scattered evenly throughout the month. To oblige the customer, the production of transmissions must be so planned that at certain intervals there will appear in finished stock enough parts to enable the assembly room to maintain an even production, thus making it possible to ship each customer at frequent intervals, a carefully graded proportion of his order.

To do this, the planning department groups all of the sales orders for that particular model that are due for delivery in a given month, and divides the total so that a certain quantity will come through, say, every five days. Thus, if all told, 2,500 transmissions must be shipped during the month, it is necessary to make 500 of them every five working days.


CLASS OF ASSEMBLY Transmission ASSEMBLY SCHEDULE ANALYSIS Month July 1920

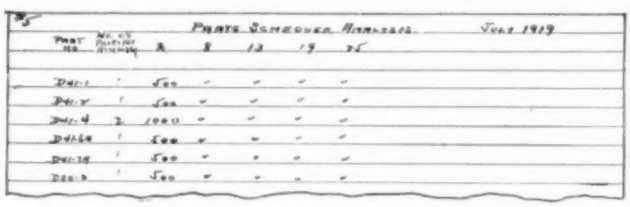
| Assembly No. | Customer | Sales Order | Sales Schedule | Quantity Scheduled | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D41 | Customer Mfg. Co. | B5216 | 15 | 15 | | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D41 | Hudson | B5216 | 2500 | 2500 | | 500 | | | | | | 500 | | | | | 500 | | | | | | 500 | | | | | | 500 | | | | | | |
| Ref. | Refrigerator | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 746 | Nash | 47000 | 2000 | 1000 | | | | | | 250 | | | | | | | | | | 250 | | | | | | | 250 | | | | | | | | |
| 746 | Chrysler | 35000 | 1000 | 600 | | | | | | 150 | | | | | | | | | | 150 | | | | | | | 200 | | | | | | | | |

FIG. 31. ASSEMBLY-SCHEDULE ANALYSIS

A better idea of this can be obtained by looking at the "assembly schedule analysis," Fig. 31, which shows the quantity to start, including a reasonable allowance for spoilage. At the right of this sheet are columns indicating the dates of delivery to the finished stores. The different models are so grouped that total may be easily obtained. Since we are concerned now solely with manufacturing we do not care to which particular customer any given model is going. All we need to know is the total number to be built and the dates on which a given quantity will be required.

Having decided to make a total of 2,500 transmission of a given model, 500 of which are destined for our assumed sales order, let dates be assigned on which delivery is to be made to finished stock as follows: July 2, 8, 13, 19 and 25.

This covers the transmission as a whole. However, the transmission is not one single part, but an assembly


PARTS SCHEDULED REQUIRED JULY 1919

| PART NO. | NO. OF PARTS PER ASSEMBLY | A | 2 | 13 | 19 | 25 |
|---|---|---|---|---|---|---|
| D41-1 | 1 | 500 | " | " | " | " |
| D41-2 | 1 | 500 | " | " | " | " |
| D41-4 | 2 | 1000 | " | " | " | " |
| D41-9 | 1 | 500 | " | " | " | " |
| D41-14 | 1 | 500 | " | " | " | " |
| D41-3 | 1 | 500 | " | " | " | " |

FIG. 32. PARTS-SCHEDULE ANALYSIS

of many parts. It is therefore necessary to analyze the assembly into its component parts and get a record of the number of parts which must be delivered to finished stock on certain dates in order to live up to the assembly schedule. That is done on Fig. 32 the "parts schedule analysis." This sheet carries the following: In the first or left hand column, the assembly number, in the next column, the part number, and in the next, the number of pieces per assembly. The dates heading the columns at the right correspond to the dates on the assembly schedule analysis on which the transmission as a whole is desired. This indicates the finishing dates of the various parts necessary for the complete assembly. The number due on any date is known as a series. That gives, for instance, five series for completion during July, and the planning department is responsible for seeing that these five series come through in July.

From these finishing points, the planning department must look backward and determine the starting dates for each part. This is done by means of a graphic schedule control chart, Fig. 33, which is the master record to the entire planning of production system.

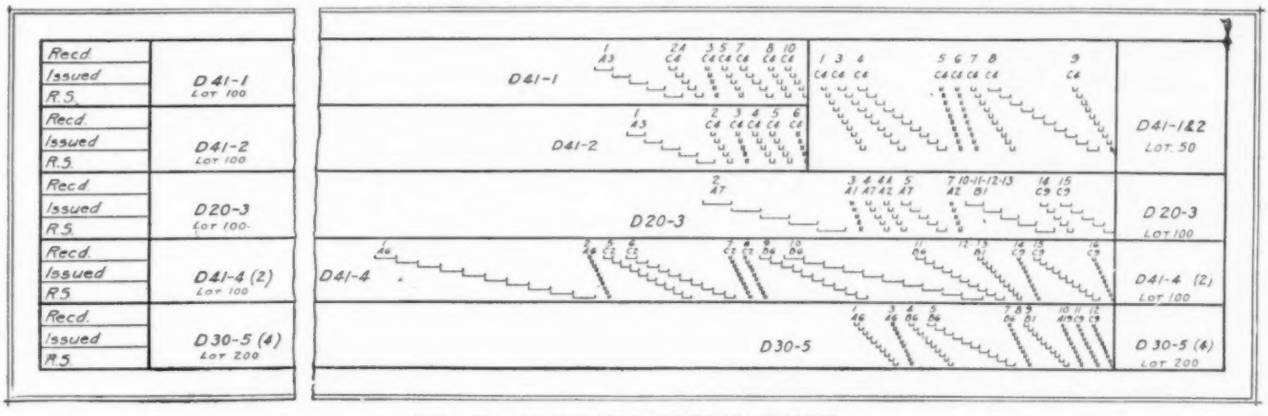



FIG. 33. SCHEDULE-CONTROL CHART
(The original of this chart was made on cross-section paper)

It is in graphic form so that the works manager can, day by day, check the entire work of the manufacturing departments and quickly see that their obligations are being met. It is futile to find fault after the delivery date is passed.

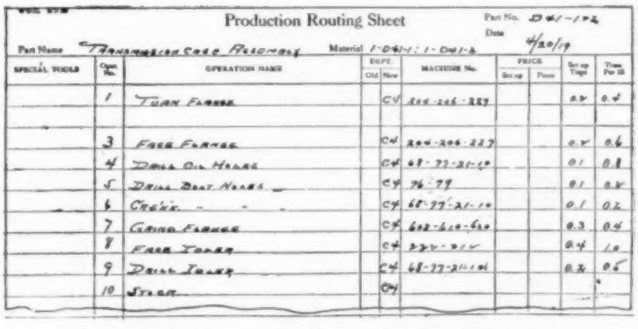
Such a chart can be made up in many ways and of many materials. My experience makes me favor preparing it on a thin vellum cross-section paper from which blueprints can be made, for the reason that in this way a master graph can be made from which as many copies can be produced as there are series.

There is one schedule-control graph for each series; it is therefore possible to have as many as ten or more schedule-control graphs on a given model. The blueprinted graphs are mounted upon display racks, which are made of some material into which a pin can be easily stuck and are so hung that they can be opened like the leaves of a book. All the graphs for one model are kept together with the series number and date due at assembly on the edge of the board.

At the right-hand edge of the sheet, is a vertical line which represents the date on which the parts are to reach the finished stores. Each division represents an hour, then since this plant has the 10-hour day, 10 divisions cover one day.

The heavy, horizontal black lines are drawn to separate the part numbers which, together with the number of pieces in a lot, are indicated in the right-hand column.

At the top of this sheet is shown part D 41-1 and 2, the latter being a sub-assembly. Part D 41-1 travels as a separate part until it has been through 10 operations where it meets part D 41-2 at its sixth operation. The two are then assembled and travel together through nine operations.


Production Routing Sheet

Part No. D41-1&2
Date 4/20/19

Part Name "Transmission Case Assembly" Material 1-041-1 : 1-041-2

| Special Tools | Oper. No. | Operation Name | Dept. Old | Dept. New | Machine No. | Price Set up | Price Piece | Time Set up | Time Per 10 |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | Turn Flange | | C4 | 206-226-227 | | | 0.5 | 0.4 |
| | 3 | Face Flange | | C4 | 206-226-227 | | | 0.5 | 0.6 |
| | 4 | Drill Oil Holes | | C4 | 68-77-21-19 | | | 0.1 | 0.8 |
| | 5 | Drill Bolt Holes | | C4 | 76-79 | | | 0.1 | 0.5 |
| | 6 | Cream | | C4 | 68-77-21-19 | | | 0.1 | 0.2 |
| | 7 | Grind Flange | | C4 | 602-610-612 | | | 0.3 | 0.4 |
| | 8 | Face Inner | | C4 | 226-227 | | | 0.4 | 1.0 |
| | 9 | Drill Idler | | C4 | 68-77-21-19 | | | 0.5 | 0.5 |
| | 10 | Straddle | | C4 | | | | | |

FIG. 34. PRODUCTION ROUTING-SHEET

To make the graph for this part, the planning man turns to his production routing sheet which is shown as Fig. 34. The ninth operation on the sub-assembly, "drill idler," takes 0.5 hours for 10 pieces. A lot of 50 pieces therefore takes 2.5 hours for operation No. 9. There are 500 pieces or 10 lots to a series which means that 25 hours are needed to complete a series. The man who makes up the graph therefore lays off 25 divisions to the left of the finish line which he divides into 10 segments of 2½ divisions each to indicate the 10 lots. Since these lots follow each other without a break there is no gap needed between lots. Bear in mind that though lots physically travel separately they do not require separate set ups.

But obviously this part cannot start on operation No. 9 the instant it completes operation No. 8. A certain gap must be allowed for trucking and sometimes for inspection. This gap between operations depends largely upon whether the planning is to limited production or to capacity. If to production, the gap should be made the irreducible minimum; if to capacity, it should be as large as the treasurer of the company will allow, basing his limit on the allowable amount of money which may be tied up in goods in process account. For it is quite obvious that the longer the gap the more work there will be between operations and therefore, the greater will be the shock absorber to take up the jolts

caused by machine breakdowns, unexpected shortage of labor and other emergencies. On an average, we allow at least six hours between the finishing of a lot on one operation, and the starting of the same lot on the following operation.

Now the eighth operation on part D 41-1 and 2 is longer than the ninth. If we started the ninth operation on the first lot six hours after the eighth operation on that lot was finished, the ninth operation would shortly be out of work. So we lay out the schedule so that the ninth operation on the last lot will start six hours after the eighth operation has been completed on all the lots and work back.

The seventh operation is, however, a shorter one than the eighth so the six hours' gap comes after the seventh operation has been completed on the first lot. This is all plain from the graph. In the same way we lay out, working backward, the time needed to perform all operations on a part until finally we determine the exact time the first operation must be started on each part to get all parts done at the same time. The figures C4 above each operation show the department which performs the operation. The numbers 1 to 9 etc. are the operation numbers.

By fastening to the top of the graph a strip showing dates based on 10 divisions to the day, we determine the exact time and date for starting each operation.

Near the left-hand edge of the sheet, a line of arbitrary length is drawn for each part and is divided into spaces, indicative of the number of lots to be run on that part. This last phase of the schedule control indicates the standing of the rough stock on each of the various parts shown. Sometimes it is desirable to make up departmental control-graphs from the master, for the booth men in the various departments. This is seldom necessary however, especially if the machine schedule described later is used.

The schedule control should not be looked upon as something hard and fixed, but rather as a flexible guide for production. It is an ideal from which we may stray, now and then, but which so often as we *do* stray, brings us back to the straight path immediately. Farther on in this article it will be shown how production is followed and kept in balance by use of the schedule control. I want, now, to impress the fact that the schedule-control graph indicates the last possible dates on which the parts may be started and brought through economically. I assume of course that the shop is in balance and that the machine tools are all loaded.

*(Part VII will be concluded next week.)*

# Modern Aviation Engines—III*

By K. H. CONDIT
Managing Editor, *American Machinist*

IN THIS installment we are showing representative motors from two air services which were not only on opposite sides but were also radically different in principle. The Germans concentrated almost their entire efforts on the engines shown, with the result that these two became exceedingly reliable but did not progress nearly so fast as the engines used by the Allies. On the other hand, the British had at one time more than 40 different types of engines in use in their land and sea forces. The difficulty in maintaining these widely varying units may be imagined. Mechanics had to be trained to know all sorts of engines, and the amount of spares required was stupendous. This experience of the Royal Air Force, coupled with the similar experience of their transportation service with a variety of motor trucks, was one of the principle reasons for our development of the standardized Liberty aircraft engine and the several standardized models of motor trucks. The saving in spare parts alone runs into millions.

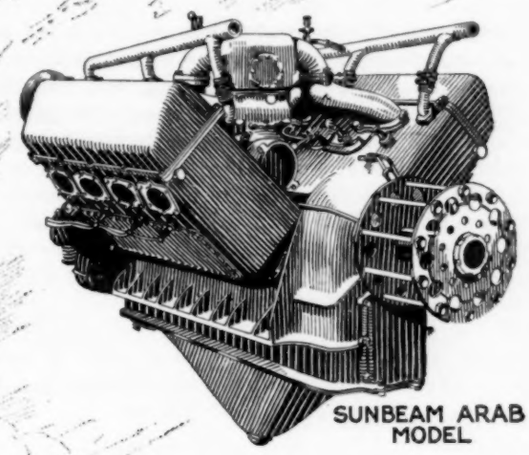
With so many British engines it is difficult to choose only two to represent the field but the recent transatlantic flights of the Vickers-Vimy biplane and the R-34 rigid dirigible airship have offered an easy solution. The heavier-than-air machine was driven by two Rolls-Royce Eagle VIII's while the lighter-than-air craft mounted five Sunbeam Arabs.

The Rolls-Royce aircraft engines earned for themselves a reputation for reliability that ranked with that of the automobiles built by the same company. They were used to the limit of the factory capacity which could be increased but slowly because of the nature of the product. The very fineness of the workmanship necessary in their construction made them unsuited to large-scale production and they were consequently rejected by our aviation authorities in favor of the untried but all-American Liberty. Several of our automobile factories made parts for the British concern, however, and aided materially in boosting production. This engine became the mainstay of the British day and night bombing squadrons, after its trial in the Handley-Page bomber which flew from London to Constantinople, bombed a Turkish battleship, and returned. This, of course, was not a continuous flight but it proved the feasibility of long-distance bombing which was later entrusted to the Independent Air Force. The supply of engines was not sufficient to meet the needs and in the fall of 1918 squadrons were fitted out with DH 9a and DH 10 machines with Liberty motors.

The actual destruction caused by this organization may not have come up to public expectations but their policy of striking at various German bases and manufacturing plants kept a large fleet of defending combat planes out of the front-line fighting, for the Germans never knew where the next blow was coming and had to keep a widely spread aërial defense constantly on the alert. The moral effect on the factory workers is another element that must not be lost sight of. No man can do his best work when he has in his mind the constant fear of explosive or gas bombs dropping into his shop.

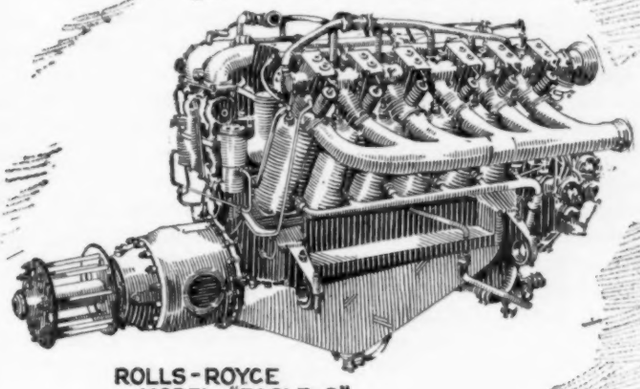
Both the British engines make use of reduction gearing for propeller drive. This, of course, permits the engine to be run at a higher and more efficient speed and at the same time increases propeller efficiency by keeping propeller speed down. An element of uncertainty is introduced in the gearing itself which experience shows has made the engine less reliable. Spur gears are used in the Sunbeam while the Rolls-Royce has an epicyclic or planetary system which turns the propeller in the same direction as the crankshaft.

*Part II was published in our March 4 issue.



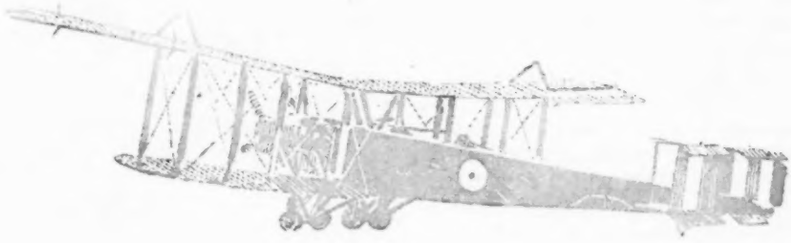
**SUNBEAM ARAB MODEL**

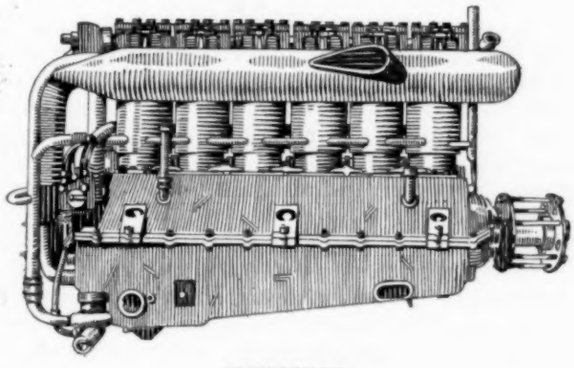
Eight cylinders; bore, 4.72 in. (120 mm.); stroke 5.12 in. (130 mm); compression ratio 5.3 to 1; rated hp., 200 at 2000 r.p.m.; magneto ignition; dry weight per hp., 6.4 lb.; fuel consumption 0.5 lb. per b. hp.-hr.



**ROLLS-ROYCE MODEL "EAGLE 8"**

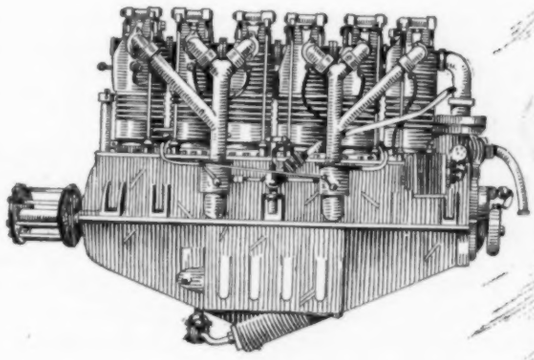
Twelve cylinders; bore, 4.5 in. (114.3 mm.); stroke 6.5 in. (165.1 mm); compression ratio 5.3 to 1; rated hp., 360 at 1900 r.p.m.; magneto ignition; dry weight per hp., 2.66 lb; fuel consumption, 0.5 lb. per b. hp.-hr.





**MERCEDES**

Six cylinders; bore, 6.3 in. (160 mm); stroke 7.09 in. (180 mm); compression ratio 4.94 to 1; rated hp., 260 at 1400 r.p.m.; magneto ignition; dry weight per hp., 3.71 lb.;



**BENZ**

Six cylinders; bore, 5.71 in. (145 mm); stroke, 7.48 in. (190 mm); compression ratio 4.93 to 1; rated hp., 230 at 1400 r.p.m.; magneto ignition; dry weight per hp., 3.68 lb.; fuel consumption 0.653 lb. per b. hp.-hr.

By-B.Z. Reiter

The Rolls cylinders are individual forgings with welded steel jackets, those of the Sunbeam being more like the Hispaño type except that the aluminum water jackets have plates held by capscrews instead of the intricate single casting. The Rolls engines look complicated because the "gadgets" are all on the outside and most of their design features are the result of years of experience in automobile engineering. The Sunbeam, on the other hand, is pretty well closed in and embodies such advanced ideas as multiple valves, each cylinder having one inlet and two exhausts. The performance of the Sunbeam engines on the transatlantic flight of the R-34 speaks volumes for their efficiency.

The problems of the German air service were much simplified by the early adoption of the Mercedes and Benz engines as standard. With engines of known weight, power and performance, their designers had only to build planes around them. Their scope was limited, of course, but where production meant control of the air they had an advantage. Apparently, they never had much success with the bigger V-type engines, for very few were used, although several models were tried. They also had a copy of the French monosoupape Gnome for their small scouts, but this engine did not have sufficient power for the heavier single-seaters of the latter part of the war.

In performance, the Benz and Mercedes engines did not differ materially, but in detail they were not much alike except in general type characteristics. Both motors were built with two inlet and two exhaust valves per cylinder, but where the Mercedes had an overhead camshaft like the ones used on the Liberty, Rolls-Royce and Renault, the Benz was fitted with camshaft in the crank case and long push-rods which operated double rockers. Both had individual cylinders with welded steel jackets and ventilated crank cases which demanded dry-pump oiling systems with double pumps and outside tanks. The carburetor air-intake pipes were installed in the crank case in each case to warm the air for the explosive mixture. This arrangement also helped to cool the hot crank case.

The Benz piston had a thin head supported by a light steel cone which connected it to the piston pin, thus taking the explosion pressure direct to the upper end of the connecting-rod. The Mercedes piston had a cast-steel head which carried the piston-pin bosses and was screwed and welded to the cast-iron skirt.

The Mercedes carburetor was placed rather low and the long intake pipe was wrapped with asbestos packing to keep the heat absorbed from the crank case.

Either of these engines was used in multiple in the big German bombing planes which aroused the wrath and condemnation of the civilized world by their attacks on Allied hospitals. This work was of a piece with the submarine warfare on hospital ships and was just as futile in attaining the desired result.

Far from terrorizing, it infuriated the Allied people and led to reprisals which never would have been thought of otherwise.

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An American firm got a nice order for threaded pipe from Australia. It made application to Washington for permit to ship, but the permit was refused. Because we were at war? Because we needed the pipe for home consumption? No. It was refused because "the application for permit did not state whether the pipe-thread was to be of linen, silk or cotton."—From *Drill Chips*.

# Why the Blueprint?

By Harry Senior

The above question raised by Frank Richards on page 871 of the *American Machinist* is timely and to the point.

The usual roll of blueprints is an unmitigated nuisance. Every mechanic who has had to use them knows how they have to be spread out (on his neighbor's bench, for if he spreads them on his own bench there would be no room to work) and the corners weighted with sundry hammers, surface gages, squares, boxes of steel figures, drill blocks, etc., until the place looks like a pawn-broker's window in a machine-shop district.

Then, when things are nicely arranged, neighbor comes back to his bench with his hands full of junk and wants to know "what the ——— ——— ———!! any way?

There is but one kind of blueprint that is worse than a rolled blueprint and that is a folded one. It

Neighbor comes back. Boul

accumulates grease and dirt at all the creases; important dimensions become obliterated; it tears along some of the folds, and, just about the time a fellow gets used to it, it separates into several minor and perfectly useless prints and the round has to be started over again.

Blueprints shellacked to a piece of heavy binder's board are perhaps the most convenient for everybody concerned, and even in this form they are unwieldy; a man cannot carry more than two at a time without a truck.

I think the post card size suggested by Mr. Richards for photographically reproduced drawings is too small. Eight by ten inches would be better for the shop, and unless a lot of prints from the same drawing are needed, the zinc plate is not necessary; direct prints on silver paper would serve the purpose.

Now don't commence to howl about the cost of silver paper. How many silver prints can be made for the price of a tracing? More than you will need probably, for the nicely mounted silver print will be taken care of, its glossy surface will repel dirt, and it will last a long time. Besides—blueprint paper is not given away now-a-days.

There is one difficulty in the way of using the photographic process to which Mr. Richards did not call attention. A drawing is seldom finished. No matter how carefully thought out was the engineer's design, there will be additions and alterations from time to time,

and the combination of pencil-drawing and tracing lends itself readily to such treatment while the nicely finished original drawing does not.

However, as Mr. Richards says, the blueprint will never be discarded, and the point at which to choose between full-sized blueprints and reduced-scale photo prints would be easily decided. Perhaps it would be well to make a tracing and work from blueprints for a time until it was apparent that no more changes were to be made immediately, and then photograph.

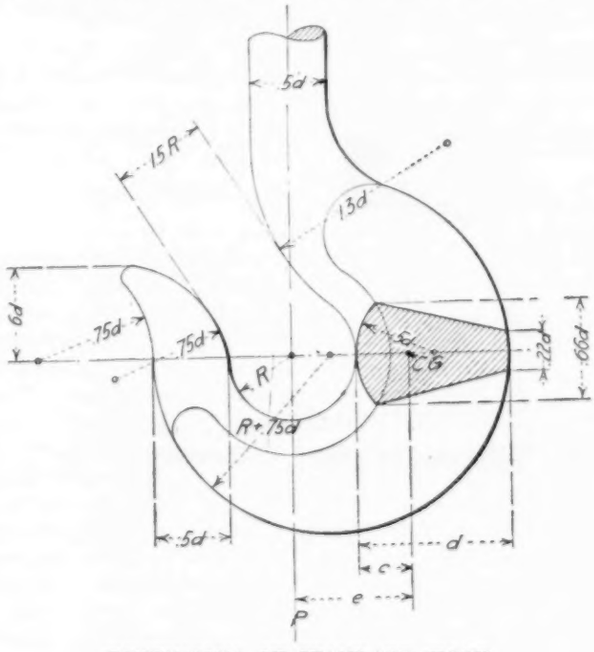
The only difference between a drawing for a full-sized tracing and a drawing for the reduced photo print aside from inking and cleaning would be that the figures and notes should be made larger in proportion, but this would not detract in the least from the value of the average blueprint.

# A Useful Formula in the Design of Crane Hooks

By Willard A. Thomas

The writer has made an examination of the various methods used in the design of crane hooks. From a strictly theoretical standpoint the formulas following the well-known theory of curved beams are sufficient to cover the proper design of crane hooks generally. Again, from a practical standpoint there is much available data which has evolved from actual tests under working conditions. As a result of these tests and studies of the theory, empirical formulas for the proportions of crane hooks have been presented, as well as tabulated proportions which have proved useful. A disadvantage that sometimes occurs in the use of tables lies in the fact that the exact requirements are not always found to be within the limits of the tables, or else that the designer must use his judgment in the selection of the nearest values of the requirements to those tabluated. The use of available formulas, however, results in more time being required to get the results.

The empirical formulas for the proportions of crane hooks as given by good authorities are not materially different one from the other, insofar as the result is concerned. In most of these formulas all of the necessary dimensions can be determined providing three requirements be established. These three are: The load to be carried, the allowable unit stress for the material of which the hook is to be made, and the radius of the inside of the hook. The first two of these requirements are always fixed for each particular case, but the third requirement which may be called the inside radius of the hook must often be proportioned by the designer. This is often the first and only obstacle to be passed in making the completed design.




DIMENSIONS OF STANDARD HOOK

For the designer who prefers to rely upon the empirical formulas in the design of crane hooks the following formula for obtaining the third requirement—the inside radius of the hook—directly from the load, is presented as a short-cut through the obstacle, or as a check.

Let $P$ equal the load to be carried by the hook, in pounds.

Then the inside radius of the hook may be made:

$$R = \sqrt{\frac{P}{4{,}000}} + \sqrt{\frac{500}{P}} \text{ inches.}$$

Using this formula and bringing the value obtained for $R$ to the nearest eighth inch will give a value closely approximating the practice of Pawling & Harnischfeger.

This value of $R$ may be at once substituted in the following formula (recommended in Kent's Pocketbook for Mechanical Engineers) for the proportions shown in the figure, together with the values already assigned to the first two requirements mentioned, and the equation solved for $d$:

$$S = \frac{P\,(7.44d + 12.39R)}{d^3}$$

Where $S$ is the allowable unit stress for the given material, in pounds per square inch.

Proportions for the complete design of the hook may then be obtained by using these values of $R$ and $d$ in the figure as shown.

It may be well to note that this last equation which has been solved for $d$, has been prepared from values assumed and substituted in the general formula for eccentric loads.

The formula for eccentric loads may be made to apply to hooks of any desired cross-section by writing it in the following form:

$$S = \frac{P}{A}\left(1 + \frac{ce}{r^2}\right)$$

Where $S$ = unit stress, pounds per square inch at the inner edge of the bend;
$P$ = load in pounds;
$A$ = the area of the cross-section, in square inches;
$c$ = distance of center of gravity of section to inner edge of bend, in inches;
$e$ = distance from line of action of load from center of gravity of section, or eccentricity of load, inches;
$r$ = radius of gyration of the section of the hook.

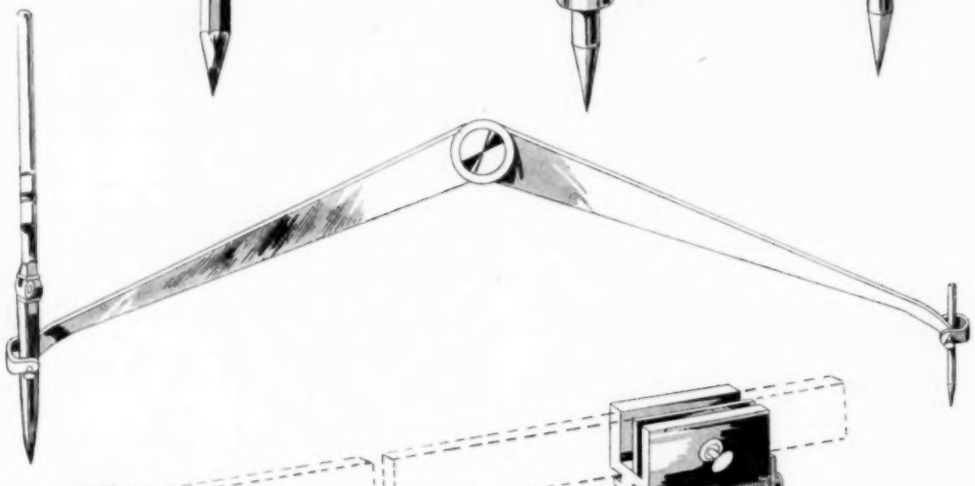
In the case of hooks of circular section, such as small hooks from round bar stock, the general formula reduces to:

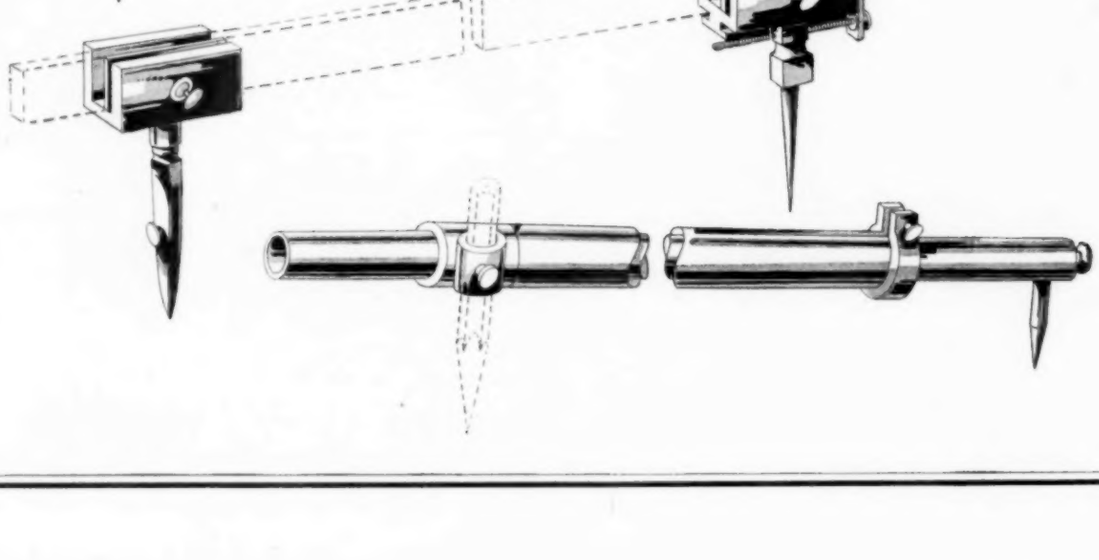
$$S = \frac{1.273Pd + 10.186Pe}{d^3}$$

Where $d$ is the diameter of the section in inches.

# FOR SMALL SHOPS *and* ALL SHOPS

*By J. A. Lucas*





# Knowing Your Insurance Policy—V

By CHESLA C. SHERLOCK

*Do you know what provisions are made in your insurance policy regarding the cancellation of it? This article tells you why your policy should contain definite statements about cancellation, and it explains the rights of the insurer and of the insured in the event of an attempted cancellation of the insurance policy by either one. Other considerations entering into the matter, such as the status of the agent of the insurer, are also treated.*

*(Part IV appeared in our June 10 issue.)*

## Rescission and Cancellation

IT IS very often necessary to know when the assured can cancel an insurance policy, just as it is necessary to know when the insurer may take this step. Laws have been passed in so many jurisdictions safeguarding the right to cancel that it has come to be taken as a matter of course in most instances.

In the case of life policies, which we have treated only incidentally and by way of reference in these discussions, the right to cancel rests with the assured at any premium-paying date. He may simply refuse or neglect to make payment when due, and this will amount to a cancellation of his policy. In cancelling the policy, however, he loses all rights thereunder, even to have the premiums already paid refunded, unless there has been a prior agreement to the contrary.

In the case of fire and casualty policies, the laws are more lenient and they have enumerated in practically every jurisdiction just the basis upon which the assured may cancel and his rights thereunder. Generally a cancellation in the case of these forms of insurance does not amount to a forfeiture of all premiums paid, but merely a forfeiture of a pro rata amount required to be stated in the face of the policy itself.

In mutual companies, the certificate of membership, the charters and the by-laws will be consulted in order to determine just the basis upon which the assured may cancel his policy and membership. It is usually recognized that such companies have the right to prescribe the manner in which the rescission of the insurance contract may take place.

### Conditions Necessary for Cancellation

Joyce says, in this connection: ". . . it may be generally stated that the right to rescind, abandon, or cancel a contract of insurance must arise either: (1) by virtue of some statute; (2) from the terms of the contract itself; (3) by reason of some breach thereof; or (4) under a power reserved therein; or (5) by mutual consent of the parties thereto. (a) If, however, the policy has been obtained under certain circumstances of fraud, misrepresentation, or mistake, a court of equity may order a cancellation; it may also rescind on a proper showing. (b) It is necessary in case of rescission or cancellation by agreement that there be a complete meeting of the minds, otherwise the agreement will not stand. (c) To the extent that insurance is a contract of indemnity that essential must be considered, as must, also, the right to have the policy continue in force according to its terms."

Where the statute provides that the assured may have a right to cancel upon request, it is held that as soon as the request is made to the insurer that it operates as a cancellation, in so far that a further continuance thereunder would be contrary to the expressed purpose of the statute.

In California, where the statute specifies grounds for the cancellation, it has been held that the assured has no right to cancel and ask for a pro rata share of the premium already paid, unless he enumerates the ground upon which he bases his action, in accordance with the statute.

### Cancellation Effected by the Insured

In New York, the statute provides: "Any corporation, person, company, or association transacting the business of fire insurance in this state shall cancel any policy of insurance upon request of the insured or his legal representatives, and shall return to him or his representative the amount of premium paid, less the customary short rate premium for the expired time of the full term of which the policy has been issued or renewed, notwithstanding anything in the policy to the contrary. Where the laws of any state permit corporations organized under its laws to cancel policies of insurance upon different terms than herein set forth, corporations organized under the laws of this state may cancel policies upon risks in any such state upon the same terms as are provided for corporations organized under its laws."

The Massachusetts standard fire policy provides: "This policy may be cancelled at any time at the request of the insured, who shall thereupon be entitled to a return of the portion of the above premium remaining after deducting the customary monthly short rates for the time this policy shall have been in force. The company also reserves the right, after giving written notice to the insured and to any mortgagee to whom this policy is made payable, and tendering to the insured a returnable proportion of the premium, to cancel this policy as to all risks subsequent to the expiration of ten days, from such notice, and no mortgagee shall then have the right to recover as to such risks."

It is well settled and there can be no doubt but that the parties have a right to cancel by mutual agreement provided the rights of third parties will not be injured by such action.

### Cancellation Effected by the Insurer

Very often the company reserves the right to cancel, or retains an option on the privilege, in the policy itself. It has been held that cancellation is not effected under an option by a mere request for the return of the policy for cancellation, nor is notice of an intention to cancel sufficient.

Cancellation may be effected by a failure to pay premiums, assessments or meet conditions as to payment expressed in the policy. It has been held in a Washington case that cancellation is effected where the insurer has directed the agent to cancel the policy on the company's books after the assured has received notice and after the expiration of the required time limit without payment.

Where it is stipulated in the contract or certificate that failure to pay premiums or assessments shall amount to a cancellation, such a failure to pay on the time set aside amounts to a cancellation. But in the case of assessment the company does not have a right to declare the contract cancelled unless such assessments were legal and binding. Illegal assessments cannot be used as a means of avoiding a valid contract.

In California, it was held that the company has a right to cancel for fraud, misrepresentation or concealment of facts material to the risk, and that where a company tendered premium back to the assured and gave notice of cancellation prior to commencement of suit that cancellation was effected.

And in a New York case, it was held that the company would have to tender dues as a condition precedent to cancellation, for the twenty-one years that they had been paid by the assured before it could cancel for misrepresentation as to age.

It has been held in another New York case that fraud of the assured is ample ground for the rescission of the policy. In fact, any misrepresentation as to a fact material to the risk which has misled the insurer in accepting the risk is proper ground for rescission or cancellation of the contract of insurance, as the case may be.

It is well settled that where the policy has been assigned to a third party as security, that the consent of the assured is necessary before the company can be permitted to cancel it.

### Necessity of Giving Notice of Cancellation

It is necessary, in order to cancel the policy, to give the notice required by the statute, in substantially the required form and within the prescribed limits of time, before the actual act of cancellation can take place. The company cannot effect a cancellation by merely making an entry on its books to that effect, for such act is without the knowledge or consent of the assured. In New York it was held that, where the cancellation was effected by a written instrument induced by false representation on the part of the company's agent, the assured is not thereby stopped to assert his rights under the policy.

It has been held in Minnesota, however, that where the company has been given notice to the effect that more insurance has been taken out contrary to the express provision in the policy, that the failure of the company to elect to cancel the same under the terms of the policy and return a ratable proportion of the premium does not justify the conclusion that it elects to continue it in force.

The cancellation clauses in insurance policies should be clearly expressed so that they may be readily understood. As to the construction which the courts will place upon them, the New York court has said: "It is a question of vital importance to the insurer and to the insured as to the precise meaning of the cancellation clause of the standard policy. The situation is not a complicated one and the court desires to so construe the clause that its meaning may be made clear."

### Status of the Agent of the Insurer

Ordinarily, the agent of the insurer has no authority to cancel, but he can act upon instructions from the insurer. It has been held that where the agent is instructed to cancel a policy by giving the prescribed notice to the assured and obtaining the policy, but through carelessness or negligence fails to do so, there is no cancellation.

And it has also been held that even though the agent has given notice to the assured but fails to tender or pay ratable premium returnable to the assured, that there is no cancellation. But, where notice has been given to the assured and he has surrendered the policy, but no money has been returned to him, there is a cancellation of the contract and the assured cannot assert his rights thereunder in case of loss.

It can be stated upon the weight of authority that where a cancellation of the policy is ordered by mistake upon the part of the insurer that the assured or those holding under him by assignment are not bound by it. And where cancellation is ordered by the insurer through the misrepresentation or fraud of the agent, it is not binding upon the assured. The New York court has said that where a clerk in the employ of the insurer enters a cancellation upon the company's books, even without notice or knowledge of the assured, that the latter cannot maintain an action upon the policy, but the majority opinion of the courts support the view first given.

### Rights of the Insured Under Wrongful Cancellation of the Contract by the Insurer

In a Federal case, the court said: "Where one party to a contract to be performed in the future, before the time for performance arrives, refuses to perform, he thereby, so far as he is concerned, declares his intention then and there to rescind the contract. Such renunciation, however, in and of itself does not work a rescission, for one party to a contract cannot by himself rescind it. But by making the wrongful renunciation he entitles this other party, if he pleases, to agree to the contract being put an end to, subject to the retention by him of the right to bring an action in respect to such wrongful rescission. . . . A declaration of the promissor before the time for performance has arrived, of his intention not to perform, is not of itself, and unless acted upon by the promisee, a breach of the contract. Such declaration only becomes a wrongful act if the promisee elects to treat it as such. If he does so elect, it becomes a breach of the contract and he can recover upon it as such."

Probably no statement by the courts more clearly expresses the rights of the assured, in case the insurer wrongfully attempts to cancel or rescind, than the above opinion. It simply means that the assured has a right of action against the insurer for breach of the contract and that he is entitled to collect whatever damage he may be able to prove as a result of such wrongful act. Or, if he so desires, he may refuse to accept the wrongful attempt to rescind as a breach of the contract and continue under it. It is needless to add, that if the wrongful act is upon the part of the assured, that the insurer has the same rights as would be the case if the conditions were reversed.

### Action Which Insured May Take

Joyce, speaking of the wrongful cancellation or termination of the contract by the insurer, says: "The general rule, however, which is undoubtedly the result of the authorities, is that upon such wrongful cancellation, repudiation, forfeiture, or termination of the contract by insurer, insured has the right: (1) To con-

sider the policy terminated and recover its just value in a proper action therefor; (2) To institute an equitable proceeding to adjudge the policy in force, and the question of forfeiture can then be determined; (3) To tender the premiums and when the policy becomes payable, an action may be brought upon the policy and the question of forfeiture be then tested."

### A Connecticut Case

In a Connecticut case, the assured attempted to recover back the premiums paid, relying upon an implied promise to keep the policy alive; but the court refused to entertain the action, saying that the assured had only three remedies, and that they were the ones named.

It is well settled that the insurer cannot cancel the policy under circumstances which would work a fraud upon the assured. This means that the insurer has a right to cancel for increased risk, where it is done in good faith, but the insurer has no right to cancel when loss is imminent, as where an approaching conflagration threatens the property of the assured.

Where cancellation is attempted by giving notice by mail, it is a rule of law that the notice must be received by the assured before loss occurs in order to release the insurer from liability.

In the whole subject of cancellation, it will be found that the general principles of the la v of contracts apply, modified and strengthened in some cases, but the evident intent of the law is to work the utmost justice between the parties in each case.

## Research Work on Gears Needed

By R. J. Chapman

The *American Machinist* has from time to time published articles entitled "Strength of Gear Teeth," such as those in Vol. 51 by Willard A. Thomas, page 273, and S. J. Berard, page 925. The writer of practically every article on this subject makes good use of the well-known Lewis formula. This formula is in general use today, and is accepted without question as being based on correct assumptions, although some little difference of opinion may, perhaps, exist in regard to the stress allowable for various materials.

Success in designing gear drives to operate satisfactorily under specified conditions is, however, very largely a matter of appreciation of what has been done before under very similar conditions; and the Lewis formula, being a formula for strength only, is of no assistance in selecting the most suitable combination of pitch, diameter, face width and material for the purpose. Experience only can determine these proportions, because, even though the gears be made to a fine degree of accuracy, and are capable of transmitting the load without tooth breakage, it does not necessarily follow that they will be satisfactory in operation.

Further investigation could be made to advantage to establish reliable data relative to the various factors that determine the smooth operation and life of gear trains. These investigations could well be undertaken by any recognized independent authority, such as the American Society of Mechanical Engineers in the United States, or the National Physical Laboratory in England. The research could be divided into three sections. The work in section one would be to establish the most suitable material for use under given conditions, the allowable stress, the allowable pressure, the resistance to abrasion, the elasticity and such things being found for different materials. Investigation in section two would deal with methods of manufacture, and an attempt would be made to define the degree of error permissible for various grades of workmanship. Research in section three would determine the influence upon the life and quiet operation of gears of such variables as peripheral velocity, load per unit of breadth, number of impacts, ratio of reduction, grade of workmanship, heating, and the disposition of metal in the gear rims and arms. Methods of gear mounting to absorb vibration, and the lubrication of gears would also receive attention.

It will be agreed that successful research work along these lines would provide dependable data for the design of gears to meet any conditions in regard to load, speed, quiet running, life and such points. Alone, the Lewis formula can only be used to ascertain the maximum permissible load to ensure freedom from tooth breakage; and, unfortunately, with many gears this is the only point checked by the gear designer, with the result that they are transmitting excessive pressure, so that backlash and noise develop in a short time.

## Bench Covering That Gave Satisfaction

By E. F. Creager

Some years since, in moving a manufacturing plant that had been arranged by a manager who had greater ideas of the office capacity needed than manufacturing knowledge, we had a large quantity of a good quality plain color linoleum left over after the offices were fitted up.

This lineoleum had already been in use for three years as a floor covering. When we set up the benches for the toolmakers and assemblers in the new plant they were not satisfactory as they had been in use for some time and were originally made of poorly seasoned material which had shrunk very much, also the surface was oil soaked and rough from use.

We could not at the time get lumber of any better quality than that in the old benches and not nearly as well seasoned, so we decided to cover the benches with the linoleum and see how it would work out. There were many sceptics. We scrubbed the old benches as well as we could, filled the cracks with wood strips and the worst depressions with a putty of saw dust, glue and calcined plaster and put on one thickness of "builders felt" paper. Over this we laid the linoleum, fastening it down with half in. No. 20 wire brads spaced one inch apart along the front edges and cross joints leaving the back edge loose for expansion. The brads were put $\frac{3}{8}$ in. from the edges of the linoleum.

These benches were used by toolmakers and assemblers on general work and after four years continuous work the covering was in excellent condition. It presented a smooth neutral-colored surface well liked by the workmen. It was of course both water and oil proof and easily kept clean. Since the above experience I have had covered several hundred lineal feet of 30-in. wide benches with linoleum which gave excellent economy and satisfaction.

On steel benches it is very good. It protects delicate work from contact with the bench metal and on large work the noise is practically done away with.

There are several cements that will hold it to the metal very satisfactorily; bicycle tire-to-rim or rubber patching cement have both given satisfaction.

# Observations of a Field Editor

By FRED H. COLVIN
Editor, *American Machinist*

## San Francisco Shops

THE machine-tool situation in and around San Francisco may be said to be similar to that in Los Angeles in many ways. The main difference is the predominance of shipbuilding and repair, and the increased saw mill and similar business in the northern end of the state. The annual machine-tool business north of the Tehachapis is estimated at about $1,500,000, or 50 per cent more than that in the southern half of the state, and giving a total of about $2,500,000 to the state.

The shipbuilding concerns utilize more large machinery than is found farther south. Then, too, there are builders of water-power machinery which runs into large sizes. This, however, is probably offset by the sugar-mill machinery of other sections, leaving the large shipbuilding interest the over-balancing factor in heavy machine tools.

The ship yards are also said to overbalance the labor market and labor conditions, being for the most part the only ones to employ specialists or operators. This, and other differences in both employing and working conditions has not tended to secure the best results during the labor differences of the past six months. It has led to a compromise or differential arrangement with the smaller shops which seems to be working out very well so far as it has had time to operate.

### The Average Shop

Manufacturing of small devices, parts for automobiles or appliances or attachments for them, affords a market for a good number of machines, although in small lots. As an example, one concern has placed forty-two well-known high-grade cylindrical grinding machines during the past year and in very few cases has more than one machine gone into a single shop. Large and well-equipped garages absorb lathes, drilling, milling and grinding machines, although not in large numbers. In both machine tools and small tools the demand is in excess of the supply, with deliveries getting worse instead of better. This is due both to the delay in shipments recently and the effect of the tie-up in the Cincinnati district.

### Possibilities of Manufacturing

Here, as elsewhere, the question of prices is being discussed from various angles, and while this is not likely to deter buying, so long as the need is urgent, there is a general feeling that the prices on some machines have now gone beyond the reasonable limit. The feeling will, of course, tend to stimulate the building of machine tools on this coast, which would meet with the hearty approval of many whose local pride is a large part of their make-up. The increase in the production of steel-mill products may make it possible for further advances in this direction, and if the coal from Alaska proves to be of the right quality, we may see a change in the dependency of the Pacific Coast on our eastern mills.

The settling of the labor difficulties here seems to bid fair to be of real benefit to all concerned. There is a sincere desire on the part of management to promote a real basis for mutual understandings with the men. One of the new developments is a differential scale graduated according to ability. The real open shop, in which a man may or may not belong to any organization, forms part of the terms of settlement. The forward looking managers are awake to the necessity of securing interest and co-operation and are keeping the men informed as to the work in hand and in other ways making them feel that they have a real stake in the business.

The results are just beginning to show in some shops, even though they are not running full handed. But production is coming along at a very satisfactory rate and in some instances, on work which can be compared with eastern products, actual production costs are said to be fully as low as in the East. This can be attributed only to better production per man because, as a rule, the quantity is much less and the machine equipment less highly specialized.

### Ex-Service Men in Shops

As in other sections of the country, the question of trained men has been a serious one, and still is. In some classes of work, where there is repetition, as in turret lathe work, it has been found that ex-service men have done remarkably well. The army discipline helps in doing just as the instructor directs and it has made good men on this work with few exceptions. The well-set-up-ness of these men is rather striking, as one goes through a shop and sees machine after machine operated by young men who have apparently just stepped off the parade ground.

In some of the factories here, such as glass bottle making, and this is a well-established industry, men and women of different nationalities are working side by side without friction, regardless of race or color. San Francisco, like New York, is a cosmopolitan city, as it is the point on the West coast where probably more nationalities meet than elsewhere. The harmonious blending of workers reflects on the broadness and liberality of the management, as without it friction would be difficult to avoid.

### Pacific Coast Motor Trucks

There seems to be quite a tendency to build, or rather to assemble, motor trucks on the Pacific Coast. And yet it is not altogether assembling, because the practice seems to be to build the frame and transmission, buying the motor and axles from standard makers of such parts.

Many of these plants were established before the war, but a number of them found their opportunity when the older and established builders were so tied up with war work as to make it impossible to supply local needs.

Some of the local builders have become well

enough established to enlarge their plants and almost all of them seem to have built up a good reputation for service and reliability. Four- and five-speed transmissions are included in the specifications, frames are heavy, and altogether there seems to be the foundation for much future business along the Pacific Coast. As these plants enlarge they will, of course, form a market for more and more machine tools of various kinds.

## Some of the Problems of Pacific Coast Shops

While the problems of the machine shops on the Pacific Coast differ in many ways from those in the East, there is one which is common to them all—the need of men who can handle work satisfactorily as it comes along. The need of practical training is even more urgent in the extreme West as "operators'" are of little use in most places on account of the lack of manufacturing shops and methods. The cry is insistent for more men and for better trained men.

Whether this lack of trained men is entirely due to union restrictions on apprentices, as some claim, or whether it is partly due to the same causes as in the East, is not altogether clear. But the shortage is apparent and the remedy is not yet in sight although an earnest attempt is being made in a number of large shops to give ambitious boys a thorough training.

### Training Mechanics

Considerable attention is also being paid to the technical high school as a foundation for mechanics of the higher grades, and for shop executives. In one case in particular the so-called technical school is, for the most part, a thoroughly practical trade school, except for such boys as are preparing for college. These boys get a year of shop work, the other boys get four years.

This shop work is thoroughly practical, is as commercial as the personnel and inclination of the school board will permit, and, so far as can be learned, actually turns out a good grade of mechanics who can go out and earn regular wages in any shop. Something over a hundred boys have been turned out from one school and a large percentage of these have worked their way up into executive positions.

The railroads, too, are paying considerable attention to the training of mechanics, as the nature of locomotive repair work demands men who can tackle almost anything which comes along.

### All-Around Men Needed

Generally speaking, it may safely be said that the shops on the Pacific Coast require a better grade of mechanics than those east of the Mississippi River.

There is little special machinery, and men must find ways and means of utilizing whatever machines, tools and appliances happen to be available. The exact material desired may not be, and at present probably is not, available and the next best substitute must be used.

Initiative and resourcefulness must be a large part of the equipment of the man who is to succeed. The "one operation" man has no place in the machine shops of this section.

The present status of industrial relations between the men and management looks hopeful, even though the dove of industrial peace has not yet satisfied itself that the warfare has actually ended. Organized labor is very strong on the coast, especially in the San Francisco district, and as is usual where an organization of any kind, either secular or religious, becomes over strong, abuses and intolerance creeps in. Bosses of the same types as we find in city politics came into power and an armed peace developed into open welfare which lasted over six months, in fact the full treaty of peace occupies much the same situation as the one concerning our relations with Germany.

The blockade has been lifted, however, in most cases, most shops are at work with a partial force, many of the old men are back and there is an earnest effort to get together on a more satisfactory basis than before.

Management is trying to establish better industrial relations with its men; works councils and similar machinery for getting in closer touch with the men are being established to afford easy and democratic channels for discussing and settling problems as they arrive.

Those high in authority are endeavoring to lead the way instead of always remaining on the defensive as heretofore, and there seem to be indications that, after the smoke of battle has cleared, there will be a better understanding than ever before. Open shop means what it says, that both union and non-union men will be employed. And the next few months should see things on a much sounder basis in every way.

### Raw Material

The Pacific Coast shops are handicapped by having two mountain ranges between them and their raw material. For while there is some iron and some coal they do not seem to be just adapted to the needs of pig-iron production. These very mountains, however, are full of streams which make it possible to produce electric power at a cost which makes the Eastern manufacturer green with envy, and rather extensive experiments are being made to secure iron and steel without the use of coke. In spite of these handicaps, however, it has been extremely interesting to find instances where small machinery has been produced and shipped East at a lower price than that of the Eastern manufacturer, and this without special machine equipment.

It is simply another case where ingenuity and initiative have devised new ways and means of getting results just as our forefathers did in the Naugatuck Valley and elsewhere, before the days of big manufacturing. For the work in this section can be called a jobbing shop business, where it is necessary to secure economical results with the least possible expenditure for special tools and fixtures. And they succeed admirably in most cases.

## The Machine-Tool Business in Southern California

The machine-tool business in Southern California has, in round numbers, an estimated annual value of about a million dollars, according to some of the best-known dealers. This business very naturally and properly centers in Los Angeles which is growing as a manufacturing center, in addition to being so overrun with tourists as to make it difficult for business men from other cities to secure hotel accommodations.

The fields to which these machines go are varied both as to product and requirements. The more standard machines, such as lathes, drilling and milling machines and shapers, are naturally the most in demand. Automatic screw machines are for the most part confined to the few shops which turn out screw-machine products, but semi-automatics are beginning to find places in some of the larger shops.

### Automobile Work Plays a Big Part

Although this is not an automobile-manufacturing center, it is estimated that the automotive industry takes from 30 to 50 per cent of the machine tools sold in this territory. This means for the most part that garages and automobile-repair shops buy many more machine tools than we are accustomed to find in the East and South. For here they do not seem contented to run an automobile-repair shop with a couple of files, a few wrenches and an oxy-acetylene outfit, with possibly a decrepit blacksmith's post drill. They have real shops with lathes, milling machines and now and then a real, honest-to-goodness cylinder grinding machine.

There are numbers of shops, not of large size yet aggregating considerable machine equipment, which make automobile parts such as light-weight pistons, piston pins, special cylinder heads, etc. Then, too, there are shops which build special motors for racing cars, for airplanes or other purposes, some of them well equipped with modern machine tools.

### Stimulating Airplane Development

The airplane has perhaps more opportunities in and around Los Angeles than in most sections. For though it may be said to be bounded by the Sierra Madre Mountains on the East and the Pacific Ocean on the West, there are eleven good landing fields which can be reached with a dead motor from a height of 5,000 ft., and many emergency landing places. The present year is expected to see considerable development in the actual use of airplanes in this vicinity—and as nothing of this kind can develop without machine tools of some sort being involved, it will have its effect on the total volume of the demand. Special planes are being built in Venice, a suburb of Los Angeles, for local use.

The machine industries of Los Angeles and vicinity, which must take in San Diego, include Diesel and plain gas and oil engines; oil-well machinery of various kinds; steel mills; sugar-mill machinery; marine engines; cranes; trucks, which except for the motor are built here; lathes and special tools; special machines for making fruit baskets and many other lines. The new plant of the Goodyear people will also utilize a large amount of machinery and will add much to the industrial tone of the city. The Savage Tire Co., at San Diego, is also enlarging its plant.

### Shipping to the Orient

The harbor at San Pedro, which is the port of Los Angeles, also boasts of direct connections to the Orient and this is making it a distributing center for goods which are to cross the Pacific. The people of Los Angeles are particularly proud of the fact that the cargoes now being shipped are almost entirely products of that city—97 per cent of the cargo of the last shipload being manufactured, or raised, within the city limits.

As in many large cities there is a tendency for manufacturing to leave the city proper for some of its suburbs. One of the well-known plants has expanded its capacity within the city limits, but others are going outside, some to a distance of fifteen miles, to secure suitable locations. The effect on labor in such cases seems to depend very largely on whether real-estate owners are reasonable human beings or belong to the hog family which we are now calling by the name of profiteer. But this is not a problem of Los Angeles alone—it is universal.

There is a movement on foot among automobile dealers and the better repair shops to insure more reliable work in garages. It is known as the Auto Crafts Association and aims to accomplish the much-desired end of securing reliable work when a car goes to a garage for any sort of overhauling. The State of Oregon enacted a law last year which required automobile repair men to be licensed the same as plumbers and electricians so as to make them responsible in case of poor work. Any move which will accomplish the desired result is to be commended by all.

### Deliveries and Prices

And now for predictions or guesses as to the future of the machine tool business in this field, based entirely on the opinions of those directly in the business. The usual complaint of slow deliveries was to be expected, these being worse than usual because the effect of the rail strike was just beginning to be felt at the time of my visit.

There is every indication of continued business for the balance of the year if those in direct contact with the field are any kind of guessers. They feel, however, that prices have been boosted beyond the safe limit for a substantial business. They admit that pre-war prices of machine tools were too low in some cases but feel that the more recent advances have not been warranted by actual manufacturing costs and they fear that the reaction will not be for the good of the industry. They also resent what they conceive to be an indifference in some cases, as to the quality of material sent to the Pacific Coast, this applying more to actual materials than to machine tools.

### Men and Management

One healthy sign is a widespread interest in the present and future relation of men and management in securing efficient production in the shops. This is noticeable with both factory and dealer, as the latter realizes that his future depends upon harmonious relations at the source of supply. Management in most shops is taking a personal interest in the welfare of men, is assisting in educational work in some of the shops and is trying to make conditions such as to secure co-operation and interest. The smaller number of men, the diversified line of work and the interest which this naturally brings, makes it more easy to avoid monotony and its evils in the shops, of labor turnover and lack of loyalty. There is a tendency toward frankness, toward laying the cards on the table as the saying goes, which can hardly help bearing fruit.

The superintendent of one large plant put it this way: "Times have changed, and for the better. It takes real managers to run a shop these days and it's a heap more credit to run one right than it ever was before."

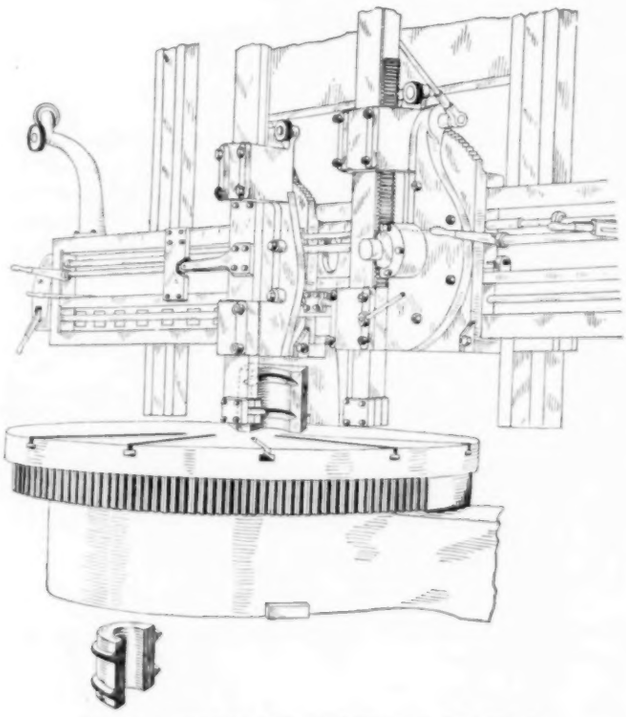
## Form-Turning on a Boring Mill

BY FRANK C. HUDSON

The accompanying illustration shows an interesting application of a form and roller to the boring of a pair of V-ways in the bed of a special gear-cutting machine at the Gleason Works in Rochester, N. Y. The form is fastened on the crossrail of the boring mill as shown, and the roll attached to the ram of the boring head. The angle of the form controls the path of the boring tool in both directions, the point of the cutting tool being set to the work by suitable gages. Both the upper and lower ways are bored from the same guide by simply adjusting the position of the roll on the ram.

The illustration makes further explanation unnecessary and shows an application which can be used in many other cases. The male member, which fits into the ways, is also turned on this boring mill by means of the same form or guide. The pieces to be turned are clamped to a special fixture so that two are turned at the same time.

This method has been used for some time and has proved perfectly satisfactory.



USING A FORM FOR TURNING V-GROOVES

## Courting Trouble

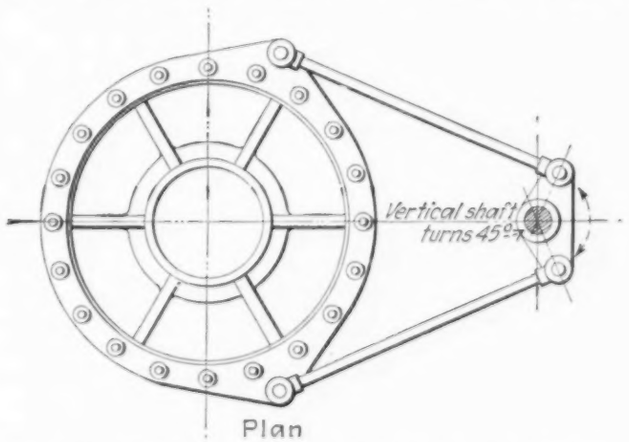
BY JOHN S. CARPENTER

It is too bad that there isn't enough trouble in this world to go around. If you don't believe it, read my story.

The sketch shows a gate rigging for a water turbine as made by a back-number shop. The ring is rotated about ten degrees on its center by means of the vertical rocker shaft and the solid-end rods, thus admitting or shutting off the water that drives the turbine. The way the thing is made is interesting, in so far as it is the way not to do it right.

The length of the rods is figured to the nearest thousandth by the draftsman, who spends about two hours in figuring the various angles and lengths necessary. As was stated above, the rods are made with solid ends, so that no adjustment is possible. As the rods are usually about seven or eight feet long, and their surfaces are not faced off so that the layer-out can do his work with facility, you can see how much probability there is of getting the centers within a tolerance of fifteen thousandths.

Sometime a bonehead erector will grout in the machine without assembling the rods and trying out the movement, in which case, should the shaft centers be out as little as one thirty-second, the thing will not go together by about twice the amount out. With a rig like this, the dice are loaded against the erector. How much cheaper and safer it would be to have right and left threads on the rods, and to have the draftsman spend his time at detailing instead of figuring.




A POORLY DESIGNED GATE-OPERATING MECHANISM FOR A WATER TURBINE

In the construction shown, one rod in tension and the other in compression under load, suppose that the lengths are such that the rods will take the load equally. The probabilities are that one rod does all the work, which shows the possibility of using a slightly larger rod with adjustable ends, which should do the work more safe'y. Certainly, a one-rod job would be much simpler in detailing, manufacturing and erecting, and the operating characteristics would not be perceptibly different from what the designer thinks a two-rod proposition is. It is foolish to use a construction such as shown, because it provides no means of adjustment, either for the erection or for the operation of the machine.

The shop above referred to still cuts almost all of their threaded work to the sharp V-thread, so that the draftsmen must be careful not to specify U. S. Standard shape on the drawings. The toolroom does not have the necessary taps and dies.

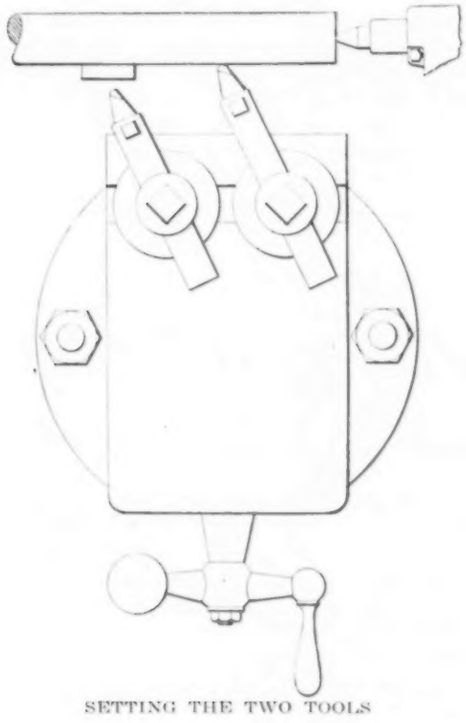
## Using Two Tools at Once

By M. Jacker

From what Mr. Pusep says on page 393 of *American Machinist*, it might be inferred that I countenance using a piece of pipe on a toolpost wrench and I do not want to be construed in that way.

I will agree that the tapping or turning of the swivel from side to side that I mentioned in my previous article could be eliminated by following Mr. Pusep's instructions; with this difference, we see that tool *D* strikes the shaft before tool *C* hits the gage; when by simultaneously screwing back the compound rest and turning the swivel to the right, tool *D* is made to slide along the shaft until tool *C* touches the gage held between it and the shaft, after which the swivel nuts are tightened.

If this swivel adjusting is done in any other way it would require the alternate screwing and swiveling back and forth till finally the desired setting is reached.



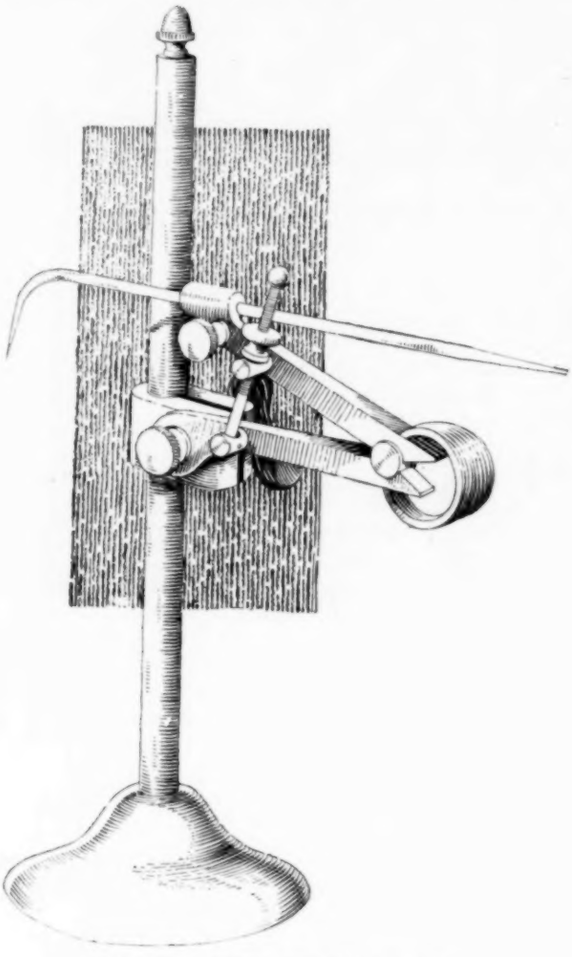
SETTING THE TWO TOOLS

## Necessity the Mother of Invention

By W. F. Hollis

On page 867, Vol. 51, of *American Machinist*, L. M. Manley describes a makeshift surface gage, the essential feature of which was an inside caliper of the wing variety.

A later counterpart of this tool—a sort of step-brother, as it were—is to be found in my bench drawer.



AN IMPROVISED SURFACE GAGE

My surface gage, which may be seen in the accompanying illustration is made from an inside spring caliper with the addition of a scriber to render it a little more universal in its application.

## Finding a Center by Trigonometry

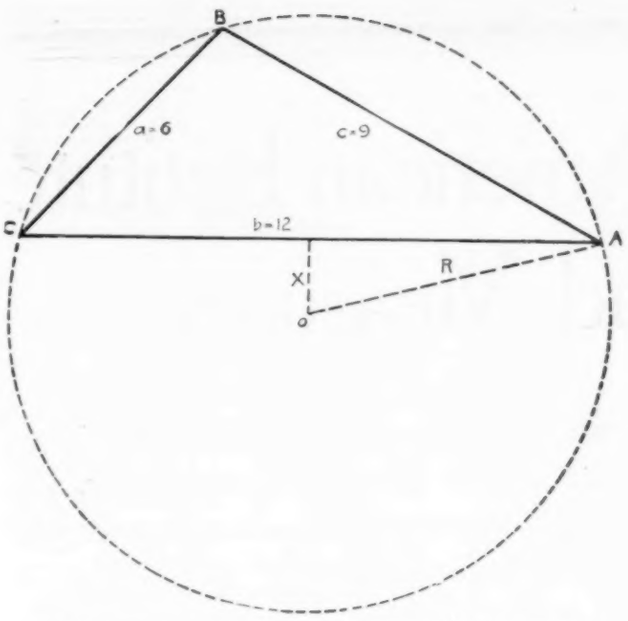
By Ernest T. Goodchild

The problem by Mr. Moore, page 584, Vol. 51 of the *American Machinist*, to find *R* and *X* may be solved more easily by using the ordinary formula for finding the diameter of the circumscribing circle of any triangle, the method being as follows:

$$\text{Diameter} = \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

when *a*, *b*, *c* are the sides and *A*, *B*, *C* the opposing angles respectively.

$$2R = \text{diameter} = \frac{a}{\sin A} = \frac{6}{\sin A}$$




LAYOUT OF THE POINTS AROUND *O* AS A CENTER

$$R = \frac{3}{\sin A}$$

but, $\cos A = \frac{c^2 - b^2 - a^2}{2cb} = 0.87500 = \cos 28^\circ\ 57.3'$

Therefore, $R = \frac{3}{\sin 28^\circ\ 57.3'} = 6.1968$

$$X^2 = R^2 - \left(\frac{b}{2}\right)^2$$

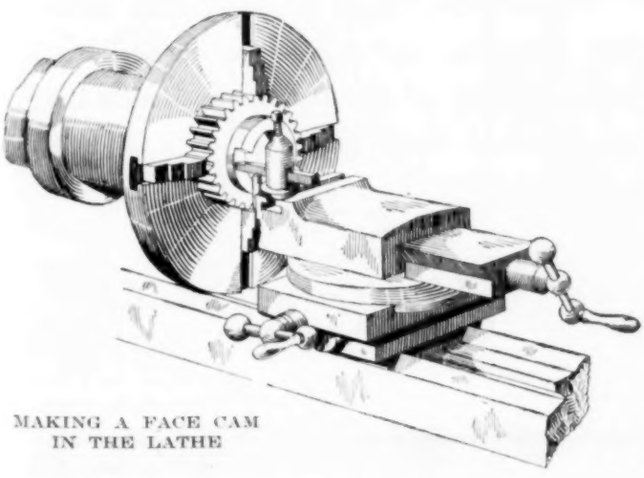
$$X = \sqrt{6.1968^2 - 6^2} = 1.549$$

With this information the holes required at *A*, *B* and *C* can be located on the circumference of the circle whose center is at *O*.

## Cutting a Cam Without a Milling Machine

BY CHAS. D. FOLSOM, JR.

The accompanying illustration shows a job which puzzled me somewhat a few days ago, the problem being to machine the cam on the shoulder of the gear shown. The piece had been made in the toolroom of this shop by the following method. The blank was held in a dividing head chuck (with the chuck in a vertical position) on a shaper table. A guiding line was scribed by means of a piece of tin wound around the shoulder. The dividing head was then turned by hand while the tool, cutting straight across the edge of the shoulder, was fed down, also by hand.



MAKING A FACE CAM IN THE LATHE

This was simply a roughing operation, and some very nice filing was required to finish the piece properly. This method did not appeal to me, so I cast about for a better way. Of course the surface could be milled by gearing the dividing head up with the table feed but incomplete equipment would have made that very inconvenient, and the corner would have had to be filed out anyway. I was about to try milling, however, when a better idea came to me. This is the method I decided upon and used. I ran a one-sixteenth milling saw through one edge of the shoulder, and milled off some of the excess metal leaving the general form of the cam. I then put the blank in the chuck of a lathe and trued it up. I geared the lathe for two threads per inch, set up a flat tool as shown, threw out the back gears and with a large wrench turned the chuck around. When the tool came to the bottom of the cam I would release the lead screw nut, run the carriage back a half inch, and re-engage the nut according to the chasing dial, meanwhile feeding the tool in by the compound rest.

I had some trouble with chattering, as the spindle bearings of the lathe were in bad condition; hence for finishing I used a regular facing tool, and fed the cross slide in after each cut instead of the compound rest. This was a little tedious, but a fairly good surface was obtained; not quite so smooth as the skilfully filed surface made previously, but mathematically correct in contour. If the piece were to be made in any quantities, I should rough shape the blanks first and then set them up in a lathe with a good rigid spindle, so that a few light cuts with a broad tool would finish the job nicely. It is a question in my mind whether this would not be more satisfactory than milling even on a production basis.

## Sweeping Back the Tide

BY A. W. FORBES

On page 1135 of the *American Machinist* Entropy suggests that it may be necessary to pay more for the rough and laborious work, than for skilled work. Similar suggestions are often heard from Socialists, only the Socialist proposes it as a matter of right, while Entropy proposes it as a matter of necessity.

My experience would indicate that there is no danger of such a change taking place for a long time to come. I find no difficulty in obtaining all the unskilled labor I want at wages from $15 per week down, but have not been able to find men of moderate ability at two or three times that amount.

The real cause of the shortage of unskilled labor is increase in the number of popular unskilled jobs, which carry some of the prestige of skill. Take, for example, the lathe hand: There are many lathe jobs of a routine nature that do not require half the skill needed to dig a sewer ditch; jobs where the tools are sharpened in the toolroom, and accuracy is not required. Yet persons holding these jobs will call themselves machinists.

It is competition with this class of work that produces the shortage of men for the disagreeable work. There is still an abundance of unskilled labor in comparison with the skilled.

# Men Back of the American Institute of Weights and Measures

THE absurdity of the claims put out by the "one man club" of San Francisco, is the best answer to its so-called "arguments."

To say that 99 per cent of the people in the United States and Britannia favor the metric system and only one per cent are against it, makes even the most rabid prometric advocate gasp — and yet this is the claim made and repeated over and over in the literature sent out from the San Francisco headquarters.

However, as long as there are people willing—from whatever motive—to flood the country with untrue, distorted and ridiculous statements that may possibly be taken at face value by the unthinking and unreasoning—just so long will it be necessary for us to guard against the attempts to put over some sort of a compulsory metric law.

It is a shame for American business to always have to be on guard against absurd, and often dangerous, legislative drags. The average "reformer" has a hammer in each hand but no practical constructive ideas in his head.

Individually, the business men of the country have neither time nor the experience to combat the pro-metric propaganda. They must resort to some special organization, just as they would employ a lawyer to defend them in a damage suit.

Recognizing this, many of the best known men, companies and associations in the United States have joined the American Institute of Weights and Measures.

This Institute was described and some of the membership requirements outlined, in our editorial "A Watch Dog of American Industry," pages 904 and 905.

On the following pages will be found a list of the present officers and members of the Institute. Read these names over carefully and compare them and their respective standing with the names published by the prometric advocates.

The Institute stands for safe, sane, industrial principles and as such is backed by a large majority of the people and industrial enterprises of America.

Ethan Viall

*Editor*

Abrasive Machine Tool Co., Providence, R. I.
Acme Machine Tool Co., Cincinnati, Ohio
Acme Machinery Co., Cleveland, Ohio
Acme Steel Goods Co., Chicago, Ill.
Adamson, Daniel, Hyde, Cheshire, England
Allen Machine Co., Erie, Penn.
Almond, T. R. Mfg. Co., Ashburnham, Mass.
Altavista Cotton Mills, Altavista, Va.
American & British Mfg. Co., Bridgeport Conn.
American Brass Co., Waterbury, Conn.
American Cement and Tile Mfg. Co., Pittsburgh, Penn.
American Electrical Heater Co., Detroit, Mich.
American Flexible Bolt Co., Pittsburgh, Penn.
American Hardware Corp., New Britain, Conn.
American Machinist, New York City
American Multigraph Co., Cleveland, Ohio
American Pad and Textile Co., Greenfield, Ohio
American Pulley Co., Philadelphia, Penn.
American Rolling Mill Co., Middletown, Ohio
American Screw Co., Providence, R. I.
American Steam Pump Co., Battle Creek, Mich.
American Sterilizer Co., Erie, Penn.
American Tool and Machine Co., Boston, Mass.
American Tool Works Co., The, Cincinnati, Ohio
American Tube and Stamping Co., Bridgeport, Conn.
American Wood Working Machinery Co., Rochester, N. Y.
Ansted Engineering Co., Connersville, Ind.
A. P. W. Paper Co., Albany, N. Y.
Armstrong, E. J., Erie, Penn.
Astoria Mahogany Co., Inc., New York City
Atlantic Works, East Boston, Mass.
Auto Engineering Co., Detroit, Mich.
Autocar Company, Ardmore, Penn.
Automatic Refrigerating Co., Hartford, Conn.

Babcock & Wilcox Co., New York City
Bagley & Sewall Co., Watertown, N. Y.
Baird Machine Co., Bridgeport, Conn.
Baker Bros., Toledo, Ohio
Baker, G. W. Mach. Co., Wilmington, Del.
Baldwin Chain and Mfg. Co., Worcester, Mass.
Ball Engine Co., Erie, Penn.
Barker, William C., New York City
Barth, Carl G., Buffalo, N. Y.
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Bausch Machine Tool Co., Springfield, Mass.
Beamon & Smith Co., Providence, R. I.
Becker Milling Mach. Co., Hyde Park, Boston, Mass.
Belden Mfg. Co., Chicago, Ill.
Beloit Iron Works, Beloit, Wis.
Benjamin Electric Mfg. Co., Chicago, Ill.
Benton Harbor Malleable Foundry Co., Benton Harbor, Mich.
Besly & Co., Charles H., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Penn.
Betts Machine Co., Rochester, N. Y.
Bigelow Co., New Haven, Conn.
Bilgram, Hugo, Philadelphia, Penn.
Birmingham Iron Foundry, Derby, Conn.
Black & Decker Mfg. Co., Baltimore, Md.
Blanchard Machine Co., Cambridge, Mass.
Blaw, Knox Co., Pittsburgh, Penn.
Bliss Co., E. W., Brooklyn, N. Y.
Blue Ribbon Body Co., Bridgeport, Conn.
Bond, George M., Hartford, Conn.
Bond, Owen W., Washington, D. C.
Boston Pressed Metal Co., Worcester, Mass.
Boye & Emmes Machine Tool Co., Cincinnati, Ohio
Bradford Machine Tool Co., The, Cincinnati, Ohio
Bradley & Son, Inc., Syracuse, N. Y.
Breckenridge, Prof. L. P., New Haven, Conn.
Brennan & Co., John, Detroit, Mich.
Bridgeport Hardware Mfg. Corp., Bridgeport, Conn.
Bridgeport Metal Goods Mfg. Co., Bridgeport, Conn.
Bridgeport Screw Co., Bridgeport, Conn.
Brier Hill Steel Co., Youngstown, Ohio
Bristol Co., The, Waterbury, Conn.
Broderick & Bascom Rope Co., St. Louis, Mo.
Brown & Sharpe Mfg. Co., Providence, R. I.
Brown Brothers Co., Providence, R. I.
Brown, Gregory, Worcester, Mass.
Brown Hoisting Machinery Co., The, Cleveland, Ohio
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Brown, McLaren Mfg. Co., Detroit, Mich.
Brown, Robert S., New Britain, Conn.
Brownell, G. L., Worcester, Mass.
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Buckeye, Jack Mfg. Co., Alliance, Ohio
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Bullard Machine Tool Co., Bridgeport, Conn.
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Chicago Screw Co., Chicago, Ill.
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Cincinnati Planer Co., Cincinnati, Ohio
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Cleveland Twist Drill Co., Cleveland, Ohio
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Espen-Lucas Machine Works, Philadelphia, Penn.
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Falk Company, Milwaukee, Wis.
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Fawcus Machine Co., Pittsburgh, Penn.
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Foote-Burt Co., Cleveland, Ohio
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French & Hecht, Moline, Ill.
Frick & Lindsay Co., Pittsburgh, Penn.
Frick Reed Supply Co., Pittsburgh, Penn.
Fuchs & Lang Mfg. Co., The, New York City
Fuller & Sons Mfg. Co., Kalamazoo, Mich.
Franklin Machine Co., Providence, R. I.

Gardner Governor Co., Quincy, Ill.
Garfield Mfg. Co., Garfield, N. J.
Garvin Machine Co., New York City
Gaskell, Robert, Brooklyn, N. Y.

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General Fire Extinguisher Co., Providence, R. I.
Geometric Tool Co., New Haven, Conn.
A. C. Gilbert Co., New Haven, Conn.
Gisholt Machine Co., Madison, Wis.
Glasgow Iron Co., Pottstown, Penn.
Gleason Works, Rochester, N. Y.
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Gordon, L. O., Mfg. Co., Muskegon, Mich.
Gorham Mfg. Co., Providence, R. I.
Gossard Co., Inc., The H. W., Chicago, Ill.
Goulds Mfg. Co., Seneca Falls, N. Y.
Grasselli Chemical Co., Cleveland, Ohio
Graham Nut Co., Pittsburgh, Penn.
Grand Rapids Show Case Co., Grand Rapids, Mich.
Graven Corp., East Chicago, Ind.
Gray Co., The G. A., Cincinnati, Ohio
Greaves Klusman Tool Co., Cincinnati, Ohio
Greenfield Tap & Die Corp., Greenfield, Mass.
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Gurney Elevator Co., Honesdale, Penn.

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F. A. Halsey, New York City
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Hart & Cooley, New Britain, Conn.
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Hayes-Ionia Co., Grand Rapids, Mich.
Hays Mfg. Co., Erie, Penn.
Harrington, Son & Co., Philadelphia, Penn.
Harrisburgh Pipe & Pipe Bending Co., Harrisburgh, Penn.
Harrison Safety Boiler Works, Philadelphia, Penn.
Hartford Machine Screw Co., Hartford, Conn.
Haskell Mfg. Co., William H., Pawtucket, R. I.
Haynes Automobile Co., Kokomo, Ind.
Heine Safety Boiler Co., St. Louis, Mo.
Hemphill Co., Central Falls, R. I.
Hendrick Mfg. Co., Carbondale, Penn.
Henry & Wright Mfg. Co., Hartford, Conn.
Herr, E. M., E. Pittsburgh, Penn.
Heyl & Patterson, Inc., Pittsburgh, Penn.
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High Speed Hammer Co., Rochester, N. Y.
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Hooven-Owens Rentschler Co., Hamilton, Ohio
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Imperial Porcelain Works, Trenton, N. J.
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International Metal Stamping Co., Detroit, Mich.
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Jenckes Spinning Co., Pawtucket, R. I.
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Jones & Son Co., E. D., Pittsfield, Mass.

Kalb, Lewis P., Cleveland, Ohio
Kearney & Trecker Co., Milwaukee, Wis.
Keller Mechanical Engrav. Co., Brooklyn, N. Y.
Kellogg Switchboard and Supply Co., Chicago, Ill.
Kempsmith Mfg. Co., The, Milwaukee, Wis.
Kennedy Valve Mfg. Co., The, Elmira, N. Y.
Kent Owens Machine Co., Toledo, Ohio
King Machine Tool Co., Cincinnati, Ohio
Knight Machinery Co., St. Louis, Mo.
Koken Barbers' Supply Co., St. Louis, Mo.

La Pointe Machine Tool Co., Hudson, Mass.
Lake Erie Iron Co., Cleveland, Ohio
Lane, H. M., Cincinnati, Ohio
Langelier Mfg. Co., Providence, R. I.
Lanston Monotype Machine Co., Philadelphia, Penn.
LeBlond Machine Tool Co., R. K., Cincinnati, Ohio
Lees-Bradner Co., Cleveland, Ohio
Leland Gifford Co., Worcester, Mass.
Chas. S. Lewis & Co., St. Louis, Mo.
Lidgerwood Mfg. Co., Brooklyn, N. Y.
Lincoln Machine Co., Pawtucket, R. I.
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Lipe, W. C., Syracuse, N. Y.
B. Lissberger & Co., New York City
M. S. Little Mfg. Co., New York City
Lodge & Shipley Machine Tool Co., Cincinnati, Ohio
Logan Iron and Steel Co., Philadelphia, Penn
Long & Allstatter Co., The, Hamilton, Ohio
Lovell Mfg. Co., Erie, Penn.
Lucas Machine Tool Co., Cleveland, Ohio
Lumen Bearing Co., Buffalo, N. Y.

Mackintosh, Major C. C., Amara, M. E. F.
Madison-Kipp Corp., Madison, Wis.
Marshall, W. H., New York City
Marvin & Casler Co., Canastota, N. Y.
Meachem Gear Co., Syracuse, N. Y.
Mechanics Machine Co., Rockford, Ill.
Mesta Machine Co., Pittsburgh, Penn.
Metric Metal Works, Erie, Penn.
Mica Insulator Co., Schenectady, N. Y.
Michigan Bolt and Nut Works, Detroit, Mich.
Michigan Screw Co., Lansing, Mich.
Miller, Chas. L., Am. Steel & Wire Co., Pittsburgh, Penn.
Miller Van Winkle, Inc., Brooklyn, N. Y.
Milton Mfg. Co., Milton, Penn.
Milwaukee Metal Trades and Founders Ass'n, Milwaukee, Wis.
Milwaukee Western Fuel Co., Milwaukee, Wis.
Millholland Machine Co., Pittsburgh, Penn.
Modern Laundry Co., Detroit, Mich.
Modern Tool Co., Erie, Penn.
Moline Plow Co., Moline, Ill.
Moline Tool Corp., Moline, Ill.
Moltrup Steel Products Co., Beaver Falls, Penn.
Morse Chain Co., Ithaca, N. Y.
Morse Twist Drill and Machine Co., New Bedford, Mass.
Morton Mfg. Co., Muskegon Heights, Mich.
Mossberg Wrench Co., Providence, R. I.
Motor Car Dealers Assn., San Francisco, Calif.
Mueller Machine Co., Cincinnati, Ohio
Murphy, H. D., Medford Hillside, Mass.
Muskegon Motor Specialties Co., Muskegon, Mich.
Mutual Wheel Co., Moline, Ill.
Myers-Whaley Co., Inc., Knoxville, Tenn.
McAdams, J. E., Dayton, Ohio
McClellan, H. S., Flint, Mich.
McConway & Torley Co., Pittsburgh, Penn.
McCord Mfg. Co., Detroit, Mich.
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McFarland, W. M., New York City

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National Acme Co., Cleveland, Ohio
National Assn. of Mfrs. of the U. S. A., New York City
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National Brass Co., Grand Rapids, Mich.
National Founders Association, Buffalo, N. Y.
National Foundry Co., Erie, Penn.
National Machinery Co., Tiffin, Ohio
National Machine Tool Builders Assn., Worcester, Mass.
National Metal Trades Assn., Chicago, Ill.
National Metal Trades Assn., Newark and New York City
National Standard Co., Niles, Mich.
National Supply Co., The, Toledo, Ohio
National Tool Co., Cleveland, Ohio
National Twist Drill & Tool Co., Detroit, Mich.
Neff, Elmer H., New York City
New Britain Machine Co., The, New Britain, Conn.
New York Engineering Co., New York City
Niagara Mach. and Tool Works, Buffalo, N. Y.
Nichols Co., A. S., New York City
Niles, Bement Pond Co., New York City
North & Judd Mfg. Co., New Britain, Conn.
North Bros. Mfg. Co., Philadelphia, Penn.
Norton Company, Worcester, Mass.
Norton, C. H., Worcester, Mass.
Nuttall Co., The, Pittsburgh, Penn.

Ohio Metal Products Co., Dayton, Ohio
Oil Well Supply Co., Pittsburgh, Penn.
Olsen, Tinius Testing Mach. Co., Philadelphia, Penn.

Packard Motor Car Co., Detroit, Mich.
Paige Detroit Motor Car Co., Detroit, Mich.
Palmer Bee Co., Detroit, Mich.
Pangborn Corp., Hagerstown, Md.
Pedrick Tool & Machine Co., Philadelphia, Penn.
Peerless Motor Car Co., Cleveland, Ohio
Penberthy Injector Co., Detroit, Mich.
Penfield, L. W., Willoughby, Ohio
Pierce-Arrow Motor Car Co., Buffalo, N. Y.
Piston Ring Co., Muskegon, Mich.
Pittsburgh Gear and Machine Co., Pittsburgh, Penn.
Philadelphia Gear Works, Philadelphia, Penn.
Pittsburgh Meter Co., East Pittsburgh, Penn.
Pittsburgh Valve Foundry & Cons. Co., Pittsburgh, Penn.
Pletz, Arthur C., Cincinnati, Ohio
Plunkett, Charles T., Adams, Mass.
Pneumatic Scale Corp., Norfolk Downs, Mass.
Porter Cable Machine Co., Syracuse, N. Y.
Porter Co., H. K., Pittsburgh, Penn.
Porter, H. K., Everett, Mass.
Post & McCord, Inc., New York City
Potter & Johnston Machine Co., Pawtucket, R. I.
Poughkeepsie Foundry & Machine Co., Poughkeepsie, N. Y.
Power Specialty Co., New York City
Premier Motor Corp., Indianapolis, Ind.
Pratt & Whitney Co., New York City
Prentiss & Co., Inc., New York City

Railway Roller Bearing Co., Syracuse, N. Y.
Raybestos Co., Bridgeport, Conn.
Redway, Dr. J. W., Mt. Vernon, N. Y.
Red Jacket Co., Davenport, Iowa
Reed Prentice Co., Worcester, Mass.
Reeves Brothers Co., The, Alliance, Ohio
Reid Gas Engine Co., Jos., Oil City, Penn.
Reo Motor Car Co., Lansing, Mich.
Rhode Island Tool Co., Providence, R. I.
Richards, Francis H., New York City
Ridgway Dynamo and Engine Co., Ridgway, Penn.
Ritter Dental Mfg. Co., The, Rochester, N. Y.
Robbins & Meyers, Springfield, Ohio
Robertson, N. A., Rockford, Ill.
Roberston, Norman, Brooklyn, N. Y.
Rockford Drilling Machine Co., Rockford, Ill.
Rockford Lathe & Drill Co., Rockford, Ill.
Rockford Machine Tool Co., Rockford, Ill.
Rockford Milling Machine Co., Rockford, Ill.
Rockford Tool Co., Rockford, Ill.
Rock Island Mfg. Co., Rock Island, Ill.
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Roger, John, New York City
Rogers, E. M., New York City
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Rogers Pyatt Shellac Co., New York City
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Rome Turney Radiator Co., Rome, N. Y.
Root & Van Dervoort Engineering Co., East Moline, Ill.
Royle & Sons, John, Paterson, N. J.
Russell, W. F., So. Milwaukee, Wis.
Russell Wheel and Foundry Co., Detroit, Mich.
Ryerson & Son, Joseph T., Chicago, Ill.
Safety Emery Wheel Co., Springfield, Ohio
Sandwich Mfg. Co., Sandwich, Ill.
Schmelzkopf, E. C., Madison, Wis.
Scott Valve Mfg. Co., Detroit, Mich.
Scranton Bolt and Nut Co., Scranton, Penn.
Scranton Forging Co., Scranton, Penn.
Sellers & Co., Inc., Philadelphia, Penn.
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Seneca Falls Mfg. Co., The, Seneca Falls, N. Y.
Service Motor Truck Co., Wabash, Ind.
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Shimer & Sons, S. J., Milton, Penn.
Siemon Hard Rubber Corp., Bridgeport, Conn.
Sigourney Tool Co., Hartford, Conn.
Simonds Mfg. Co., The, Pittsburgh, Penn.
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Singer Sewing Machine Co., Elizabeth, N. J.
Sipp Machine Co., Paterson, N. J.
Skinner Chuck Co., The, New Britain, Conn.
Sleeper & Hartley Co., Inc., Worcester, Mass.
Sligh Furniture Co., Grand Rapids, Mich.
Slocomb & Co., F. F., Wilmington, Del.
Slocomb, J. T., Providence, R. I.
Smith, T. H., Jamestown, N. Y.
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Speakman Co., Wilmington, Del.
Spencer Wire Co., Worcester, Mass.
Standard Conveyor Co., St. Paul, Minn.
Standard Engineering Co., Elwood City, Penn.
Standard Motor Construction Co., Jersey City, N. J.
Standard Underground Cable Co., Pittsburgh, Penn.
Stanley Works, The, New Britain, Conn.
Starrett Co., The L. S., Athol, Mass.
Steptoe Co., John, Cincinnati, Ohio
Stevenson, S. P., Treas. Stevenson Cold Storage Door Co., Colchester, Penn.
Strelinger Co., The Charles A., Detroit, Mich.
Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y.
Studebaker Corp., South Bend, Ind.
Stuebing Truck Co., Cincinnati, Ohio
B. F. Sturtevant Co., Hyde Park, Boston, Mass
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Swain, George F., Boston, Mass.
W. K. Swigert, Indianapolis, Ind.

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Taft-Pierce Mfg. Co., Woonsocket, R. I.
Tagliabue Mfg. Co., C. J., Brooklyn, N. Y.
Taylor & Fenn Co., The, Hartford, Conn.
Taylor Instrument Co., Rochester, N. Y.
Taylor, Stevenson, New York City
Taylor, Wm., Leicester, England
Ternstedt Mfg. Co., Detroit, Mich.
Thayer, B. B., New York City

Thew Automatic Shovel Co., Lorain, Ohio
Thorn, Charles N., New York City
Timken Detroit Axle Co., Detroit, Mich.
Toledo Machine and Tool Co., Toledo, Ohio
Toledo Scale Co., Toledo, Ohio
Towne, Henry R., New York City
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Transue & Williams Steel Forging Corp., Alliance, Ohio
Traut & Hine Mfg. Co., New Britain, Conn.
Tucker, W. W. & C. F., Hartford, Conn.
Tyler Co., The W. S., Cleveland, Ohio

Underwood Typewriter Works, Erie, Penn.
United Engineering and Foundry Co., Pittsburgh, Penn.
Union Iron Works, Erie, Penn.
Union Manufacturing Co., New Britain, Conn.
Union Steam Pump Co., Battle Creek, Mich.
U. S. Ring Traveler Co., Providence, R. I.
Union Steel Casting Co., Pittsburgh, Penn.
Universal Winding Co., Providence, R. I.

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Van Dorn & Dutton, Cleveland, Ohio
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Van Norman Machine Tool Co., Springfield, Mass.
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Viall, Ethan, New York City
Vonnegut Machinery Co., Indianapolis, Ind.
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Vulcanized Rubber Co., The, New York City

Wagner Mfg. Co., E. R., North Milwaukee, Wis.
Walden-Worcester, Inc., Worcester, Mass.
Walker, O. S., Worcester, Mass.
Walker Weiss Axle Co., Flint, Mich.
Wallace Barnes Co., Bristol, Conn.
Wardwell Braiding Mach. Co., Central Falls, R. I.
Warner & Swasey Co., Cleveland, Ohio
Warner Bros. Co., Bridgeport, Conn.
Warner Gear Co., Muncie, Ind.
Warner, Worcester, R., Cleveland, Ohio
Warp Compressing Machine Co., Worcester, Mass.
Waterbury Farrell Foundry and Machine Co., Waterbury, Conn.
Watkins, Alfred, Hereford, England
Watson-Stillman Co., Aldene, N. J.
Weimar Brothers, Philadelphia, Penn.
Westcott Motor Car Co., The, Springfield, Ohio
Weston Automatic Machine Screw Co., Elyria, Ohio
Westinghouse Air Brake Co., The, Wilmerding, Penn.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Penn.
Weston Electrical Instrument Co., Newark, N. J.
Whitcomb-Blaisdell Machine Tool Co., Worcester, Mass.
Whitman & Barnes Mfg. Co., Akron, Ohio
Whiting Co., George, Chicago, Ill.
Whitney & Son, Winchendon, Mass.
Williams, H. R., Hamilton, Can.
Williams, White & Co., Moline, Ill.
Willys-Overland Co., The, Toledo, Ohio
Wilmarth & Morman Co., Grand Rapids, Mich.
Wilmot Castle Co., Rochester, N. Y.
Wilson, H. D., Pittsburgh, Penn.
Winter Bros. Co., Wrentham, Mass.
Witry, L. W., Waterloo, Iowa
Woods Machine Co., S. A., Boston, Mass.

Yale & Towne Mfg. Co., New York City
Yeomans, Lucien I., Chicago, Ill.
Young & Co., J. S., Hanover, Penn.
Youngstown Sheet & Tube Co., Youngstown, Ohio

Zinn, Inc., Simon, New York City

# EDITORIALS

## Discouraging Airplane Building

ARE we to repeat again the colossal blunder of neglecting the development of our airplane resources?

Are we, at some future time, to waste millions in a "last moment attempt" to turn out machines for war purposes, as we did during the World War?

The millennium is not here. Wars are *not* over. A war may come quickly from an unexpected quarter. If it does, we will be at the mercy of enemy aviators unless we are ready to get off the mark at the crack of the pistol.

All other nations of our class are quietly mapping out an aeronautic program with commercial and military advantages in view.

The United States, however, is slumping back into pre-war conditions and forgetting all the bitter lessons of our humiliating experience in building war planes.

On June 11, the Curtiss Aeroplane & Motor Corporation, claiming 75 per cent of the entire output of the American aircraft industry, announced that it would practically abandon the manufacture of commercial planes.

This is the result of the failure of Congress to protect our markets from the dumping of foreign machines.

If this big corporation is compelled to discontinue the development of commercial machines, we will lose one of the greatest assurances we have for the preservation of peace.

Nothing can be done to definitely relieve the situation until Congress meets again, but in the meantime it is the duty of every loyal American to impress on his Congressman the importance of as early action as possible.

Again we want to urge the necessity of having practical business men, manufacturers and engineers in congress and in public office. E. V.

## Fire and the Machine Shop

MACHINE shops do not, as a rule, pay sufficient attention to the fire hazards which exist on their own premises or on surrounding property. The average man sees little to burn as he walks through the aisles of lathes, milling machines and other tools. And yet one has only to visit any machine shop after a fire to see how much fuel the fire found on which to feed.

Too many place reliance on what we are pleased to call fireproof buildings, but many of these are a snare and a delusion. And even were the building itself fireproof we must not forget that it is the contents rather than the building in which we are most interested. We must not forget that combustibles such as oil and waste, can burn inside the strongest vault that was ever constructed.

No matter what the type of building may be, it is a safe plan to have its contents protected by some good sprinkler system. These are the safeguards recognized by all fire departments and fire-prevention engineers. They are the nearest to a real "safety first" device which has yet been produced.

In a recent fire on the Pacific coast a so-called fireproof or slow burning construction, was levelled in a night with a loss of over $100,000 in machinery, tools and fixtures. And because they had placed entire faith in a supposedly fireproof building, they carried but $12,000 insurance.

Fire prevention is one of our greatest problems because it involves the human element to such a tremendous extent. Carelessness causes millions in losses every year, the smoker being largely guilty simply because he carries fire in some form or other. Matches, pipes, cigars and cigarettes, carelessly handled, start many fires, and largely because we are lax in enforcing the fire rules.

"No Smoking" signs should not be put up unless they are to be obeyed by all, from the boss to the office boy.

And when they are put up, they should be rigidly obeyed by all. Rules which are not enforced soon breed contempt for all rules—which is a dangerous state of mind in any shop or community.

At this time, when production is so badly needed, every dollar and commodity lost in a fire caused by carelessness is a calamity—a crime against country and community. F. H. C.

## Freight Car Orders

COMPETENT authorities estimate that we should have at least 200,000 more freight cars than are now in service ,to take care of transportation needs.

Approximately 100,000 new cars are needed annually to replace those scrapped.

On June 1, the total number of freight cars on order with car builders, amounted to about 41,000.

One large company wrote us that they didn't have an order on their books!

Most of the orders for the 41,000 were placed the last of May, and less than 3,000 freight cars were built in that month!

The builders have a present capacity of about 25,000 per month or 300,000 per year; 240,000 cars have actually been built in a single year in the past.

The fault for not placing orders lies, primarily, with the red tape, unbusinesslike methods and foolish handling under Government ownership. Following this the Interstate Commerce Commission has failed to settle the rate question, making it impossible for the roads to know where they stand in regard to future finances, and in consequence they cannot safely place any large order of any kind. If this Commission would spend less time prying into things it has no business to, and would settle a few really important questions the country would be a great deal better off. As it is, the car shortage is getting worse with no real remedy in sight. E. V.

## All-Metal Airplanes

THE recent announcement of the formation of a company to manufacture all-metal airplanes sounds good. The elimination of the fire hazard is a long step in the right direction, even if there were no other advantages. Of course, an all-metal airplane can stay in the air no better than the common kind if power fails, but this is being rapidly solved by the use of multiple engines. Along with the fireproof factor, the absence of struts and wires is a distinct advantage in the commercial development of the airplane, since lessened resistance means conservation of power. The much slower deterioration of parts makes the upkeep of the all-metal far less than that of the wood-and-fabric machine. It is entirely possible that in time the use of anything but metal in the construction of an airplane will be forbidden, on account of its greater degree of safety. E. V.

## File Your Catalogs with the American Chamber of Commerce in France

IF YOU are making efforts to increase your foreign business, the American Chamber of Commerce in France is in a position to assist you greatly. It has inaugurated a catalog-file system, the object of which is to place catalogs of American firms before important and reliable French buyers.

Under this method preliminary correspondence can be abolished. French buyers come to this Chamber and, from an inspection of the catalogs, choose the articles they desire, without loss of time. They can then communicate immediately with the seller without having to wait two months or more to receive trade literature.

Your catalogs in this file serve the purpose of a representative in France. It brings your line of goods to the attention of French buyers and consumers. The catalog file is given extensive publicity, and all important French firms know of it. It is under the direction of courteous and experienced personnel.

An annual fee of ten dollars is charged by the Chamber to cover expenses incurred. This fee entitles each subscriber to have catalogs on file for the period of one year. The fee also entitles the subscriber to ten different headings in the Catalog Card Index. If the subscriber desires to be listed under additional headings (more than ten) an additional fee of one dollar per heading is charged.

Upon receipt of catalogs, address cards are filled out, showing name and number assigned to the catalog. These cards are systematically filed under the headings given by the subscriber. The catalogs are placed in individual file boxes, each box being given a number. This number is placed on each of the file cards.

For example: A firm interested in the sale of hardware wishes to appear under the following headings: "Bolts, Files, Locks, Saws, Hammers, Nails, Screws, Faucets, Cutlery and Wrenches." Accordingly, ten address cards are filed under the titles enumerated, each card bearing the catalog number. The system is so simple that prospective French buyers can easily obtain the catalog in which they are interested.

Write *now* to the American Chamber of Commerce in France, 32 rue Taitbout, Paris, France, for further details and for the Catalog File Entry Blank. Upon receipt of this blank, fill it out and send it in, together with your catalogs and subscription fee, and the Chamber will do the rest.

## What Is an Engine Lathe?

BY L. L. THWING

There is probably not much, if indeed any, difference of opinion on the question of what an engine lathe is. It is usually considered to be a metal-turning lathe with back gears, or geared head, and screw-cutting parts. Possibly a screw-cutting lathe with an open-belt cone drive would also be so classified. A lathe without screw-cutting parts is called a plain turning lathe or sometimes a stud lathe; although this latter title is more frequently given to a plain turning lathe without back gears. Is there any common understanding on these points?

The old name was turning lathes, or slide lathes, and the first of these was the commonly used expression during the sixtiees. When the term engine lathe first came into use, what was its special significance? In one instance noted by the writer two lathes differing only in size were referred to as turning lathe and engine lathe, the larger lathe bearing the latter title, the headstock being referred to as the "engine." Possibly the readers of *American Machinist* can shed a little light on the derivation of this common expression.

# WHAT to READ
## —for the man in a hurry

## *Suggested by the Managing Editor*

MANY aspects of mechanical evolution may be seen from a study of old machines. It will do you good to postpone the analytical articles for a half hour or so and start right in with Associate Editor Ellsworth Sheldon's "leader" on "Some Examples of Early Machine Design." The old, old machine is sometimes retained out of a feeling of sentiment and if so, it will generally be found in the plant museum; however, many are covering floor space next to ultramodern machines and turning out their proportion of parts in a very satisfactory way. You will develop feelings of admiration and respect for the earlier designs after reading this story about the old-timers. Without half-trying, not so many years back, you could insert your elbow between spindle gear and back gear, on a lathe, or get your leg chewed up a bit by the exposed feed gears, or slide a finger between cone and headstock when shifting belts. As a planer operator, you became quite expert at getting clamps, plugs and wrenches from the bed before the table got back—until the day you became too careless. Then these conditions changed—the workmen's compensation laws, careful employers and safety guards have stopped almost all of the maiming. But lack of standardization of safety appliances in the various states, causes their satisfactory design and application to machines to be a very difficult task. "Standardization and the Safety Movement" by C. E. Oakes and J. A. Dickinson endorses a National Code for guards and devices to protect operators. The authors show how the adoption of standardization and National Codes in other ways has proved very beneficial and also what is being lost though lack of standardization in our safety devices—Page 9.

Drilling has always been considered about the easiest job in the shop. So it is, if the drill is ground correctly, and the feed and speed are right for the material being drilled. To get these things right is easy, too, if you know how. A great deal has been said and written concerning drills and drilling, and much of it has been really instructive. Now the movies are helping to disseminate the "know-how" and there is no reason why the information so presented shouldn't stick, having the advantage, as it does, of a very complete graphic method of instruction. On page 11 Western Editor J. V. Hunter tells the story of the Cleveland Twist Drill Co.'s educational film, "The Proper Use and Care of the Twist Drill."

*Most of the prominent presidential candidates have announced their faith in education as a prime necessity for America. We indorse this stand without reservation. Many men in our field have had neither the time nor the money for the advantages of a college education but this is no indication that they are uneducated. To many such men "American Machinist" has been an invaluable aid. It is our aim to make it indispensable and certain comments that have come to us make us believe that we are on the right road.*

We publish in full, beginning on page 14, the presidential address delivered by Elbert H. Gary, at the annual meeting of the American Iron and Steel Institute. The title is "The Ship of State." All are rightfully and dutifully concerning themselves at present with the ship of state, and can probably receive from this address, the facts or advice needed to clarify some uncertain points. It is a clear statement of the present physical and industrial status of the United States, and is a splendid argument for a universal policy of honesty and co-operation. Read it—page 14.

Part VII of W. R. Basset's series on Modern Production Methods treats of "The Central Control of Production." This is an important subject, well treated; it includes details which are going to be very useful to the man who is using this series as a guide to his work. This week's installment begins on page 17.

The third part of "Modern Aviation Engines," a series by the Managing Editor, gives some pertinent facts concerning British and German airplane motors and gives a very good explanation of the action of the United States in insisting upon our own standardized Liberty Motor. Page 20.

On page 25 begins the fifth of Chesla C. Sherlock's treatises on "Knowing Your Insurance Policy." He takes up cancellation in all its phases.

Editor Colvin has been examining the machine-tool field in the Pacific Coast states. His field notes, page 28, give a first-class analysis of conditions in California. The West is progressive and is in a location good for foreign trade. Its manufacture will increase and develop that demand for machine tools which has already been felt to a slight extent.

# SHOP EQUIPMENT NEWS

-Edited by-
E. L. DUNN and S. A. HAND

**SHOP EQUIPMENT • NEWS •**
A weekly review of modern designs and • equipment •

*Descriptions of shop equipment in this section constitute editorial service for which there is no charge. To be eligible for presentation, the article must not have been on the market more than six months and must not have been advertised in this or any previous issue. Owing to the news character of these descriptions it will be impossible to submit them to the manufacturer for approval.*

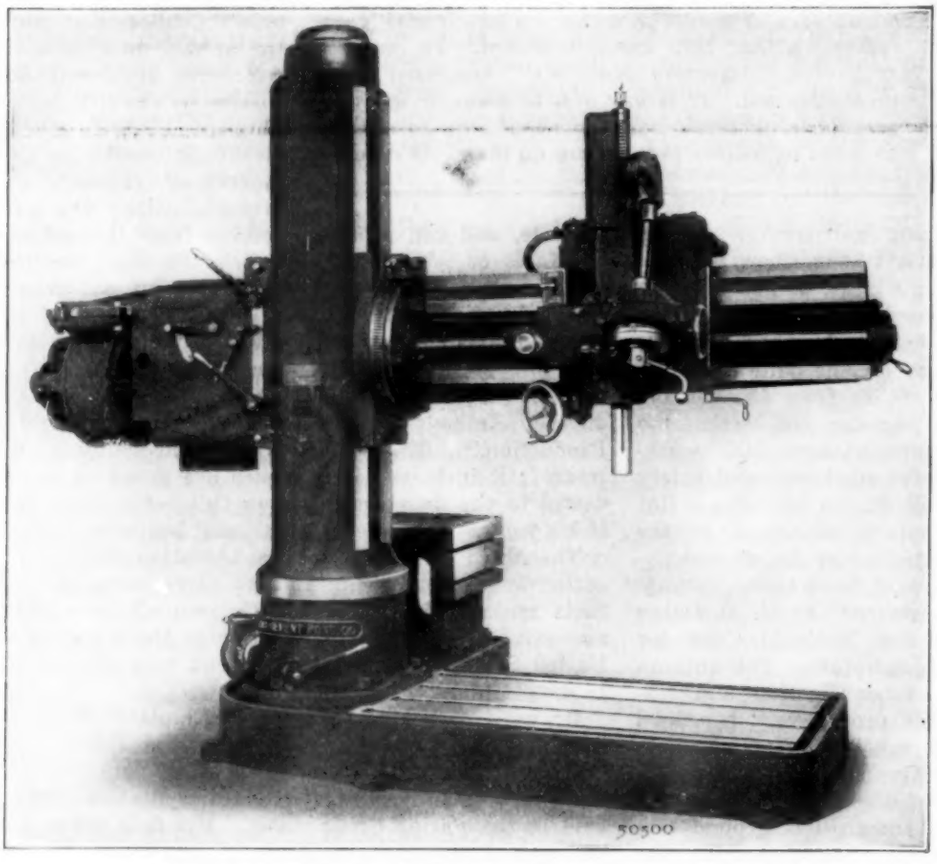
**• CONDENSED • CLIPPING INDEX**
A continuous record of modern designs • and equipment •

## Niles-Bement-Pond Right-Line Radial Drilling Machine

Niles-Bement-Pond Co., 111 Broadway, New York City, has brought out a radial drilling machine, which is made with both 5- and 6-ft. arms and named the Right-Line Radial Drill. The accompanying illustration shows the 5-ft. full universal machine, although plain machines are also made. Probably the most noteworthy feature is embodied in the design of the column, which permits of a simplified drive. All controls are operated from the head, and the column clamp is electrically operated, so that the machine requires only electric power for its operation.

The base of the machine has an extension, which carries a table back of the column and at right angles to the main working surface. The column consists of two box-section members cast integrally at the top and bottom, the saddle of the arm sliding on V's on the front and back. Due to the wedging action of the V's, the arm and column are held very rigidly together when clamped. Since the column rotates with the arm, the bending stresses due to the cut are always taken by the column in the same plane, the two sections of the column being designed as beams to resist the bending action.

The column casting extends through the pedestal to the bottom of the base, and is supported vertically on a ball-thrust bearing at the bottom and laterally by two roller bearings. Flat steel springs lift the column a few thousandths of an inch, so that the flange clears the top of the pedestal. The arm and column can then be easily swung on the bearings, as the center of gravity of the moving aprts is located nearly directly over the ball bearing.




FULL UNIVERSAL, 5-FT. RIGHT-LINE RADIAL DRILLING MACHINE

Specifications: Distance under spindle to base: minimum, 12 in.; maximum, 68 in. Base: working surface, 5 ft. 11 in. x 3 ft. 6 in. Table top, 23 x 27 in.; height, 30 in. Spindle traverse, 18 in. Feeds: number, 8; amount, 0.006 to 0.06 in. per rev. Hp. of driving motor, 10. Spindle speeds, number, 28; amount, 20 to 400 r.p.m. Height, 11 ft. 6 in. Diameter of floor space required, 15 ft. 5 in.

To clamp the column so as to prevent turning, it is pulled down against the pressure of the steel springs supporting it so that the flange bears on the pedestal. This is done by means of a hinged conical ring which, when contracted, forces the column flange downward against the pedestal. The clamping ring is operated through a wormwheel by a small electric motor, which is controlled by the small switch at the left-hand side of the drill head. A lever for clamping by hand is also provided, this being located on the pedestal itself. The bearing surface between the column flange and the pedestal is wide, furnishing a large metal-to-metal contact and relieving the roller bearings from the drilling strains.

The arm is raised and lowered by power from the driving motor operating through a revolving nut on the station-

ary elevating screw, which is suspended from the top of the column and prevented from turning only by friction in its bearing. The small centrally-pivoted lever on the rear saddle of the arm engages the mechanism, while the two longer levers are used to clamp the arm in place. The elevating and clamping mechanisms are interlocking, so that the elevating mechanism cannot be disengaged until the clamps are released, nor can the arm be clamped until the elevating clutch is disengaged.

An automatic stop prevents accident in case the arm is run to the limit of its travel either up or down, the revolving nut coming in contact with a pin on the screw, thus causing the screw to turn and the arm to come to a stop. In case the arm or spindle strikes an obstruction in lowering, the elevating screw is lifted slightly from its bearing so that the screw turns freely. The cross-section of the arm is of unusual design. The upper guide for the saddle is of the dovetail type, and the lower bearing is set back so as to bring the horizontal driving shaft close to the spindle.

The motor is mounted on the back of the arm saddle, and drives the spindle through a horizontal shaft running between the column members. This makes it possible to have only four gears and one double-faced pinion between the motor and the spindle, and to apply the driving power to the lower end of the spindle. The back gears run in oil in a case located next to the motor.

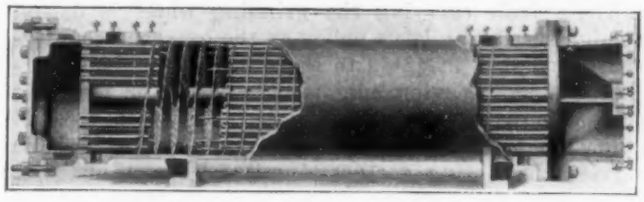
The driving motor is controlled by the lever shown at the lower right-hand side of the drill-head, making it possible for the operator to start, stop, reverse and vary the speed without changing position. This feature is particularly valuable when tapping. A 4-to-1 variable-speed motor is used when direct current is available, such a drive being shown in the illustration. For alternating current, a gear box is connected to the constant-speed motor to give the necessary speed range. Sixteen speeds are provided in either a high or low range. Dynamic braking is provided with both types of drive, so as to give the quick stopping necessary when tapping.

The feeds are geared, the gears running in oil. The feed is changed by turning the small disk conveniently placed at the left-hand side of the driving head at the same height as the horizontal drive shaft. The range of speeds and feeds is sufficient to take care of any boring ordinarily required, in addition to drilling and tapping.

The drill head is traversed along the arm by the small handwheel at the lower left-hand side of the head. For rapid movement of the spindle the knob-ended lever is turned by hand. When this lever is pulled down it engages the power feed. Hand feed is obtained by the handwheel at the right of the head. A depth gage with an automatic trip for the feed is provided, this being set by means of the large disk shown on the front of the driving head.

## Griscom-Russell Multiwhirl Oil Cooler

The Griscom-Russell Co., 90 West St., New York, manufactures the device illustrated herewith for cooling oil used in lubrication of turbine bearings and reduction gears, or quenching oil in the heat treating of steel.



GRISCOM-RUSSELL MULTIWHIRL OIL COOLER

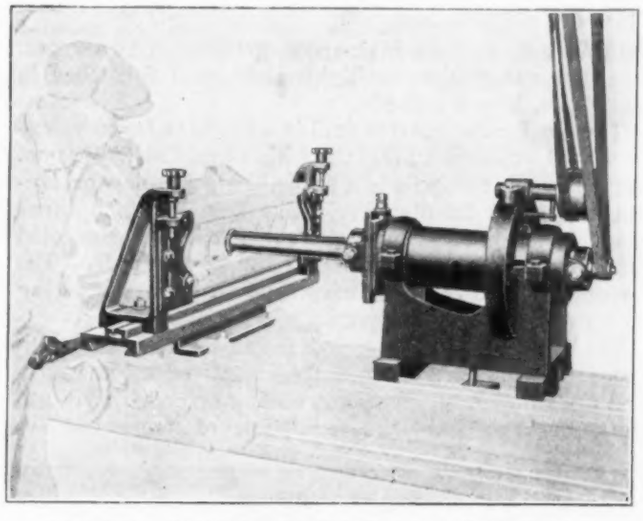
It is claimed that the oil is constantly circulated through the cooler, and kept at a constant temperature permitting both the continued use of the original quantity of oil and its maintenance at the proper viscosity for efficient results.

The apparatus takes its name from the whirling path of the oil, which path is accomplished by the use of the helical baffle which directs the oil in its flow. The baffle also serves to bring the oil into intimate contact with the cooling surface.

The shell is of cast iron and the tubes of seamless drawn brass or copper, expanded into a fixed tube plate at one end and into a floating head at the other, which latter permits expansion and contraction without strain on the tube joints.

## Fox Cylinder Boring and Grinding Machine

The Sunderland Machine Shop, Omaha, Neb., has recently added to its line the machine shown in the accompanying illustration for re-boring and grinding automotive cylinders. The attachment is intended for garage and repair-shop work; and it is designed to fit a standard lathe, being entirely independent of the lathe headstock. The base of the grinding head can be



GRINDING CYLINDERS ON THE FOX BORING AND GRINDING MACHINE

Specifications: Size; to fit lathes of 14- to 24-in. swing; to hold blocks of 1 to 6 cylinders; to bore and grind cylinders of 2½-in. dia. and larger. Swing; over ways, 22 in. Length of spindle, 15¼ in. Weight boxed, 500 lb.

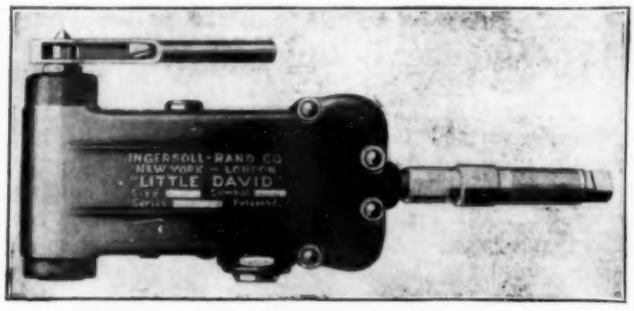
adjusted to suit different distances betwen the lathe Vs. The table upon which the cylinder blocks rest is fastened on the carriage of the lathe. The brackets can be adjusted to hold cylinder blocks of various sizes, and a micrometer cross-feed is provided for bringing different cylinders into alignment with the spindle.

The spindle carrying the grinding wheel is driven at high speed by a large pulley on the overhead countershaft, and it is mounted in three double-row ball bearings. A slow-moving spindle outside of the grinding spindle is driven through gears by a belt from a small pulley on the countershaft. The slow-moving spindle carries the boring tool; and micrometer adjustment is provided for regulating both the eccentricity of the tool and that of the grinding spindle.

The machine can be used on either open- or closed-head cylinders. It is claimed that the machine can be quickly attached to the lathe and that the changing from boring to grinding is easily done. The machine is completely equipped with all necessary attachments and a countershaft.

## Ingersoll-Rand "Little David" Pneumatic Tools

Several types of small portable pneumatic tools have recently been added to the "Little David" line, manufactured by the Ingersoll-Rand Co., 11 Broadway, New York. The tools include a small size of close-quarter

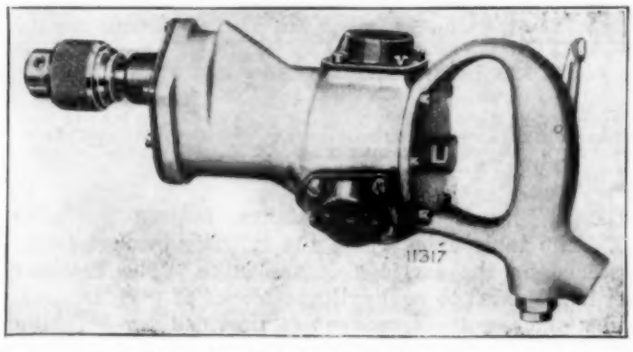



NO. 8 "LITTLE DAVID" CLOSE-QUARTER DRILL

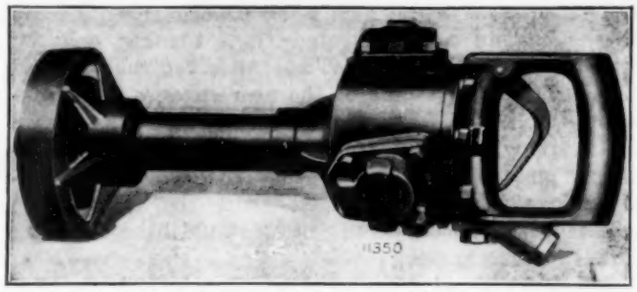
drill, No. 8, a small high-speed grinder in two types, Nos. 601 and 602, and a lightweight drill furnished in two styles, Nos. 6 and 600.

The No. 8 close-quarter drill is a machine for use close to a wall or corner. This machine runs at 250 r.p.m. without load, and will handle drilling, reaming or tapping up to 1¼ in. diameter. The spindle which turns the drill is operated by three rocking levers connected directly to the pistons through connecting rods. The motor is of the three-cylinder type with pistons acting at right angles to the levers.

The Nos. 601 and 602 grinders are light-weight high-speed tools running with a free speed of 4,200 r.p.m., and are suitable for grinding, buffing or polishing work. Both machines have the same type of motor but are




NO. 6 "LITTLE DAVID" DRILL




NO. 601 "LITTLE DAVID" GRINDING MACHINE

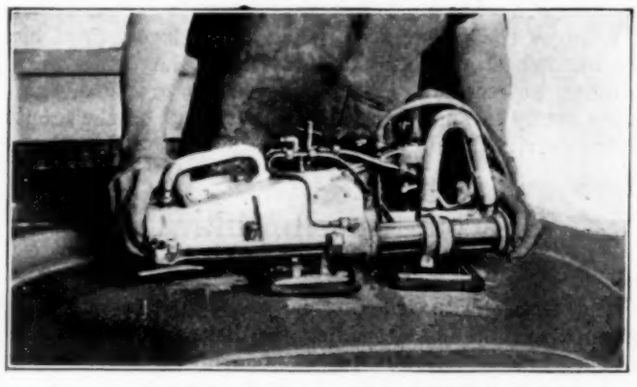
equipped with different throttles and handles, the 601 having the closed type of inside trigger handle, while the No. 602 is fitted with the rolling type of throttle handle. The three-cylinder motor runs constantly in a bath of oil, insuring lubrication of all the parts. The valve is integral with the crankshaft, simplifying the design. Ball and roller bearings are used throughout. The removal of a few screws enables the handle to be lifted off exposing the entire mechanism to view, making easy inspection of the parts.

The Nos. 6 and 600 drills are intended to meet the demand for light air-tools for drilling small holes without breakage of drills. They will handle twist drills up to ⅜ in. diameter. The free speed at 90 lb. air pressure is about 2,000 r.p.m. The two machines differ only in the handle construction, the motors being the same. The No. 6 has the pistol-grip type of handle, while No. 600 is furnished with breast plate and rolling throttle handle. Aluminum reinforced with steel bushings is used wherever possible and results in a very light-weight machine, the No. 6 weighing only 9 lb. The motor is of the three-cylinder type, and the cylinders are separate iron castings, easily accessible, renewable and interchangeable. The bearings are all either ball or roller type.

## Brown Rubbing Machine

The Franklin Products Co., Inc., Syracuse, N. Y., has placed on the market the rubbing machine illustrated herewith. The machine is intended to supplant hand rubbing in paint shops and the claim is made for it that by its use twice as much work can be done as by hand rubbing.

The machine has two feet, or kickers, working in opposite directions and uses compressed air as a propellant. The construction of the rubbing feet makes it possible to rub on uneven or rounded as well as on flat surfaces. The frame and all parts possible are made of aluminum

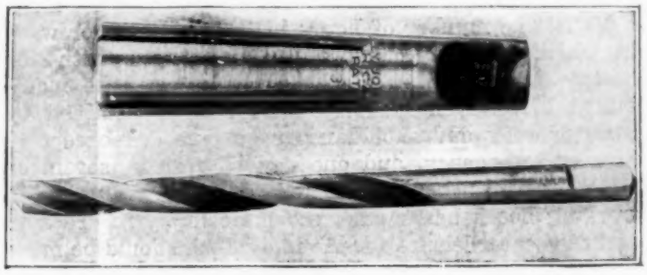


BROWN RUBBING MACHINE ON AUTOMOBILE WORK

and the total weight is but 20 lb. The machine can be used on both vertical and horizontal surfaces. It uses the same materials as are used in hand rubbing.

## The Wearever Drill Chuck

The Scully-Jones Co., Railway Building, Chicago, Ill. has placed on the market the drill chuck, or collet, shown in the illustration herewith. The object of this



WEAREVER DRILL CHUCK AND DRILL WITH FLAT SPOT FOR DRIVING

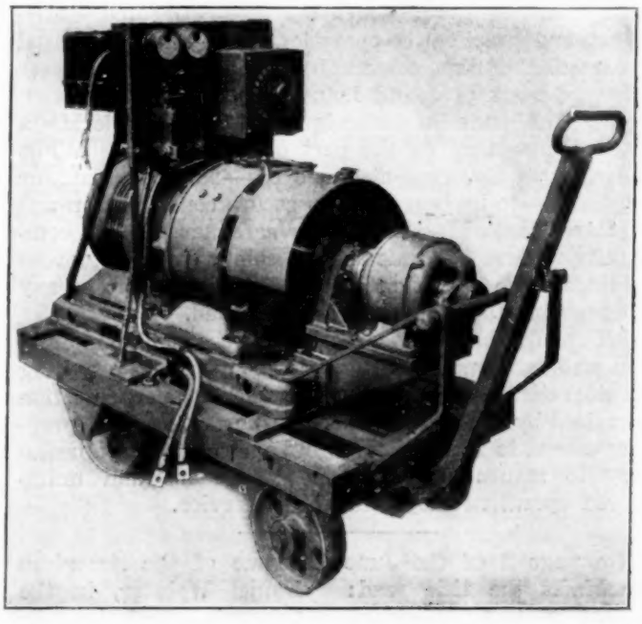
chuck is to provide a taper shank which can be used to hold a straight shank drill in the taper hole of a drilling-machine spindle. The only operation necessary to prepare a drill for use in this chuck is to grind a flat spot on the shank, as shown on the drill in the illustration.

One advantage claimed for this chuck is that when used in a multiple-spindle drilling machine, drills can be spaced much closer than if held in the ordinary type of drill chuck.

The chucks are made with tapers to suit all standard drilling-machine spindles and with holes to fit all sizes of straight-shank drills.

## Westinghouse Single-Operator Electric Welding Outfit

The single-operator electric arc-welding equipment shown is manufactured by the Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa., and is said



WESTINGHOUSE SINGLE-OPERATOR ELECTRIC WELDING OUTFIT

to be exceptionally efficient because the generator operates at arc voltage and no resistance is used in circuit with the arc. The generator is designed to inherently stabilize the arc, thereby avoiding the use of relays, solenoid control-resistors, etc.

The generator has a rated capacity of 175 amperes and is provided with commutating poles and a long commutator, which enable it to carry the momentary overload at the instant of striking the arc without special overload protection.

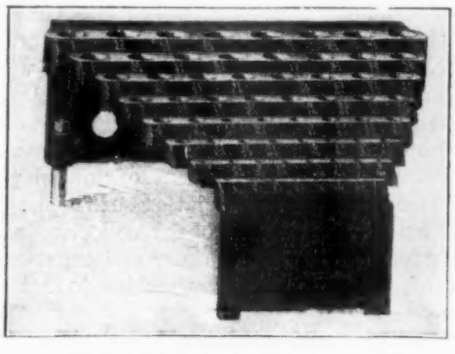
Very close adjustment of current may be easily and quickly made, and, once made, the amount of current at the weld will remain fixed within close limits until changed by the operator. There are twenty-one steps provided which give a current regulation of less than 9 amperes per step and make it much easier for a welder to do vertical or overhead work.

The generator is mounted on a common shaft and bedplate with the motor. A pedestal bearing is supplied on the commutator end and carries a bracket for supporting the exciter which is coupled to the common shaft. Either d.c. or a.c. motors can be supplied. Where an a.c. motor is used leads are brought outside the motor frame for connecting either 220- or 440-volt circuits. An electrician can change these connections in a few minutes' time. This feature is desirable on portable outfits which may be moved from one shop to another having a supply circuit of different voltages. For portable service, the motor-generator set with the control panel is mounted on a fabricated steel truck, equipped with roller bearing wheels. The generator is compound-wound, flat compounded, that is, it delivers 60 volts at no-load and also at full-load.

## Peerless Gaging Drill Rack

The drill rack illustrated herewith is manufactured by the Peerless Machine Co., Racine, Wis.

The drills are placed in the holes with their points downward. The holes go clear through the rack and



PEERLESS GAGING DRILL RACK

each hole is of two diameters, the first part being the nominal diameter of the drill it is intended to hold and the latter part the diameter of the next smaller drill in the set. A drill larger than the first part of the hole will not enter and a smaller drill will fall through, but a drill of the right size will enter the hole intended for it a certain distance, where it will be stopped by the smaller diameter of the hole. Thus a drill that will enter a hole and stay there is necessarily in its right place.

The racks are made in seven sizes, the smallest for drills $\frac{1}{16}$ to $\frac{1}{2}$ in. and the largest for drills $\frac{11}{16}$ to $1\frac{1}{8}$ in.

# U. S. Chamber of Commerce Conducts Referendum on Industrial Relations

Twelve principles of industrial relations, prepared by a special committee, were sent out to a vote today of the more than thirteen hundred industrial and commercial organizations comprising the membership of the Chamber of Commerce of the United States.

The principles are intended to include the fundamentals of employment relations. The committee that drew them up is composed of members of the Chamber's board of directors. It was appointed after the close of the President's First Industrial Conference to consider the principles presented by the employers' group in the conference.

The Committee's report, containing the proposals submitted for a vote is given as follows:

Employers' relations in American industry should accord with and express those ideals of justice, equality and individual liberty which constitute the fundamentals of our national institutions. The terms of employment should conform to the essential requirements of economic law and sound business practice. They should, through intelligent co-operation, based on a recognition of mutality of interest conduce to high productive efficiency. They should reflect in ever-increasing degree an effort to realize broad ideals of individual and social betterment. In Government and public service employment the orderly administration of government must be assured, and the paramount interest of the public protected. With these essential purposes in view, and conscious of the obligation of management to insure their observance and practical operation in industrial affairs, the Committee on Industrial Relations of the Chamber of Commerce of the United States of America, states its belief in the following principles:

I. Any person possesses the right to engage in any lawful business or occupation, and to enter, individually or collectively into any lawful contract, either as employer or employee. These rights are subject to limitation only through a valid exercise of authority.

II. The right of open-shop operation, that is, the right of employer and employee to enter into and determine the conditions of employment relations with each other, is an essential part of the individual right of contract possessed by each of the parties.

III. All men possess the equal right to associate voluntarily for the accomplishment of lawful purposes by lawful means. The association of men, whether employers, employees or others, for collective action or dealing, confers no authority over, and must not deny any right of, those who do not desire to act or deal with them.

IV. The public welfare, the protection of the individual and employment relations require that associations or combinations of employers or employees, or both, must equally be subject to the authority of the state and legally responsible to others and their agents.

V. To develop with due regard for the health, safety and well-being of the individual, the required output of industry is the common social obligation of all engaged therein. The restriction of productive effort or of output by either employer or employee for the purpose of creating an artificial scarcity of the product or of labor, is an injury to society.

VI. The wage of labor must come out of the product of industry and must be earned and measured by its contribution thereto. In order that the worker, in his own and the general interest, may develop his full productive capacity, and may thereby earn at least a wage sufficient to sustain him upon a proper standard of living, it is the duty of management to co-operate with him to secure continuous employment suited to his abilities, to furnish incentive and opportunity for improvement, to provide proper safeguards for his health and safety and to encourage him in all practicable and reasonable ways.

VII. The number of hours in the work day or week in which the maximum output, consistent with the health and well-being of the individual can be maintained in a given industry, should be ascertained by careful study and should never be exceeded except in case of emergency, and one day of rest in seven, or its equivalent, should be provided. The reduction in working hours below such economic limit, in order to secure greater leisure for the individual, should be made only with full understanding and acceptance of the fact that it involves a commensurate loss in the earning power of the workers, a limitation and a shortage of the output of the industry and an increase in the cost of the product, with all the necessary effect of these things upon the interest of the community and the nation.

VIII. Adequate means, satisfactory both to the employer and his employees and voluntarily agreed to by them, should be provided for the discussion and adjustment of employment relations and the just and prompt settlement of all disputes that arise in the course of industrial operation.

IX. When, in the establishment or adjustment of employment relations, the employer and his employees do not deal individually but by mutual consent, such dealing is conducted by either party through representatives, it is proper for the other party to ask that these representatives shall not be chosen or controlled by, or in such dealing in any degree represent, any outside group or interest in the questions at issue.

X. The greatest measure of reward and well-being for both employer and employee and the full social value of their service must be sought in the successful conduct and full development of the particular industrial establishment in which they are associated. Intelligent and practical co-operation based upon a mutual recognition of this community of interest, constitutes the true basis of sound industrial relations.

XI. The state is sovereign and cannot tolerate a divided allegiance on the part of its servants. While the right of Government employees—national, state, or municipal—to be heard and to secure consideration and just treatment must be amply safeguarded, the community welfare demands that no combination to prevent or impair the operation of the Government, or of any Government function shall be permitted.

XII. In public service activities, the public interest and well-being must be the paramount and controlling consideration. The power of regulation and protection exercised by the state over the corporation should properly extend to the employees in so far as may be necessary to insure the adequate, continuous and unimpaired operation of public utility service.

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On page 2 of the June 10 issue of the *American Machinist* the title read: "Daniel Webster, in the Senate in 1883." This was a printer's error; the year should have been 1833.

# A Letter to the Editor

Editors, *American Machinist.*

Gentlemen:

I am in receipt of a letter from the World Trade Club of San Francisco inclosing what purports to be a copy of a letter submitted to you by one of your correspondents. The letter follows, *verbatim ad literatim.*

Washington, D. C.,
23 March, 1920.

To the *American Machinist*

I see in this weeks' issue of the Machinist that Mr. W. F. Belding wants to hear the views of a mechanic in reference to your present antimetric propaganda.

Well, here you have mine. For the past 15 years on and off you have had articles covering this subject, and I always believed you were right. Have read everything that Halsey has written and also F. G. Barth et al. Maybe I am in error as to F. G. B., but there has been enough of the other M.E's, B.S's, etc., to fill many books.

Now I cannot flatter myself as to my school education, but I have learned a few things in the past 25 years, and one is that the metric measurement is very simple if a man will forget his 64th, 32nd, and so forth, take his little meter scale or micro and go to it.

It is now 30 months ago that I enlisted in the U. S. Engineers and was assigned to a college to make sound ranging instrumeuts, where we had the misfortune (so I believed) of having everything metric, and I can tell you that for a few days the air was blue with profanity on account of it. The more so as I had been taught to believe that that sort of measuring was N.G. as per Halsey et al.

Well, to make a long story short, I had to learn it and forget our standard system. I now prefer it to the inch. Don't worry about the expense; we mechanics will not have to spend millions of dollars. No, only about $3 apiece and that will not break us. Most of your automatic machinery will require no extra attachments, and all lathes will need only a gear change to cut screws. Most milling machine work is worked to a stop or in jigs. Drill press don't count at all. Calipers work just the same, and when it comes to drills, well, I prefer to say .1 mm. or 1.2, —2.6, —7.3 mm., than run No. 1 down No. 60 and ¼ in. up to 2 in. It is just as easy to read a micrometer to .01 mm. as .001 inch.

This is what I have learned in the past 30 months. Just forget about the so-called terrible monetary loss and in a year or two we will all be running along and never give our old system a second thought. Most of our manufacturers can make these changes so gradually that there will hardly be a ripple in their business.

I am inclined to believe that if they would not follow your advice so explicitly on this one subject they would come thru with very little trouble in their business.

You used to be my "guiding star," and still are, but on the C.G.S. system, I will have to "kick over the traces."

Yours very truly,
(Signed) F. W. GEIB.

I believe that this "practical mechanic," as he is called in the letter in which the above was an inclosure, in his enthusiastic support of what is to him a new idea, has, like the sponsors of metric legislation, overlooked some very important considerations to which I would direct his attention. In other words, he has become temporarily impractical.

In his third paragraph your correspondent says that he has learned (within the last thirty months of a period of twenty-five years) that "the metric measurement is very simple if a man will forget his 64ths, 32nds, etc., take his little metric scale or micro and go to it."

If that were all there is to it, I cannot well gainsay his proposition; but he has built into his formula the same stumbling block that has brought about the downfall of empires—the little word "if." Let us see what bearing this word has upon his precept.

Assuming that your correspondent has been successful in sweeping from his mind all remembrances of the English standards and their binary subdivisions, and has taken up his "little metric scale" to get a measurement of something that is already in existence; something that must be repaired or replaced. He will find that the measurement will not conform to any division of his metric scale for the reason that it was made without reference to metric units.

Whatever measurement he may desire to make, on whatever machine, apparatus or device constructed in this country since the time of the Pilgrim fathers, will present the same difficulty. Whether his measurements are to be taken in meters, liters or grams, the same trouble will be encountered; practically *nothing* will conform to his new standards. Surely the difficulty of translating the dimensions that are, to the dimensions he would have them be, would disturb his tranquil forgetfulness. Would not the necessity of taking off a little here or adding a little there to make concrete realities measure up to idealistic theories, compel him to recommit to his memory the knowledge of feet and inches, gallons, or bushels, that he had so carefully eliminated therefrom?

But let us assume that he ignores future troubles and has translated his first measurement to the 'steen hundredth part of a meter. He will go to his lathe or milling machine to reproduce the part of which he now knows the dimensions to the 0.0005 mm. only to find a new difficulty; all the screws are made to English measurements. A half turn of this wheel or a quarter turn of that handle would no longer mean anything—besides, he could not use a half turn or quarter turn, for halves and quarters are binary; not metric. He will be obliged to replace all the screws of his milling machine with screws made to metric leads and redivide the dials in accordance therewith. If he can do this on a single machine for $3 he need never worry about the metric system. In order to make screws of metric lead he must compound for his lathe a set of change gears that will involve some very awkward sizes or else require some of them to be made with a half-tooth, or perhaps two-thirds of a tooth; and though he should finally adjust this difficulty there are many lathes, requiring many gear cutters, to supply the millions of change gears that would be needed.

Fortunately, there are plenty of gear cutters, but alas! these too are all built to the alleged cumbersome English system of measurements, and to rebuild them would require the good office of the very lathes and milling machines for the rejuvenation of which the metamorphosed gear-cutters are desired. Just where, may I ask, would he begin to commence?

"We mechanics will not have to spend millions of dollars. No, only about $3 apiece." If your correspondent refers to those mechanics whose entire kit of tools consists of a hammer, a couple of chisels and a monkey wrench wrapped up in a jumper, I must concede the truth of his statement; but what of those mechanics whose kits are valued in hundreds of dollars, at least half of which amount represents fine measuring tools and standards?

He speaks of his "metric micro": Where can he buy a "metric micro" for $3? I do not want any, but according to my memory of their catalogs Browne & Sharpe and Starrett quote them at prices ranging from $7.50 to $50 or more, and if he knows where they are made and sold for $3 it is not a bit "clubby" of him to keep his knowledge to himself.

"Milling machine work is worked to jigs and stop screws": Sometimes. But the jigs and stop-screws, if already made, are made to English standards, and to be consistent your correspondent must replace them with others made to metric standards. I will venture to say that $3 would not go far toward such replacement.

"Drill presses do not count": Yet I have seen many drill-presses the sleeves of which were graduated in *inches* and all shaft and spindle sizes, as well as all distances between centers and shoulders made to English standards, thereby necessitating, when the time for repair or replacement comes, the entire reconstruction of the machine at once or else the perpetuation of the system of measurements that your corerspondent so much desires to forget.

Your correspondent does not like to "run down" drills from numbers 1 to 60 nor run them up from ½ to 2 inches; he would, therefore, do away with all existing drill gages. Replacing these gages with others of metric size would make further inroads upon the original $3. And did he never hear of reamers?—or taps?

The problem is not one of dollars and cents; nor of English versus French system of mensuration. There are no strings upon the writer of that letter to prevent him from measuring anything he likes in any way he likes. Why, then, should he seek to impose restrictions upon others that, if conditions were reversed, *he* would be prompt to resent?

I have no quarrel with the metric system! If any one is foolish enough to *want* to measure in a system that is so inconvenient, so utterly unrelated to anything that is, whose very foundation is a scientific error, let him "take his little metric scale or micro and go to it;" I shall never say him nay. I *am*, however, unalterably opposed to having such a system arbitrarily foisted upon millions of sane and sensible people at the instigation of a bunch of faddists who are not practical enough to know that the realization of their objective would plunge American industry into chaos.

HARRY SENIOR.

# SPARKS FROM THE WOR

*Valentine Francis*

## Four Thousand "Turn-Auto" Devices to Be Made

What is probably one of the largest industrial contracts in Knoxville for the current year was closed on June 3 when A. W. Knowles, treasurer of the Turn-Auto Corporation, and the Wm. J. Oliver Manufacturing Co., closed a contract for the manufacture of 4,000 of the product of the former company at a cost of $1,800,000. The contract will necessitate the employment of 400 men and the operation of the Oliver plant day and night for the balance of the year. The Turn-Auto machine is a newly invented machine by which the "get out and get under" feature of auto repair is eliminated.

The Turn-Auto machine enables an automobile to be run on the machine and then turned to any position convenient for the worker. It consists simply of a cradle into which a car can be run and in which it can then be tilted any desired angle. It is far superior to any elevated or pit track.

The contract came to the Oliver Co. after the Turn-Auto Corporation had tried unsuccessfully to have its product manufactured in Indiana and Bayonne, N. J. Labor troubles finally drove the company to the South and because of its facilities for handling the work, the Wm. J. Oliver Manufacturing Co. secured the contract.

Work on the contract will start as soon as possible. The contract is one of the indications of the gradual turn of the tide of industry from the North to the South and which it is believed will be particularly favorable to east Tennessee because of its natural facilities in the forms of fuel, ores and central location for transportation.

Ralph L. Rogers and W. P. Davis have secured the agency for nine states in which they will introduce the new machine.

## Passing the Buck

A pleasant pastime known as "passing the buck" or "Let George do it" seems to have grown up in many of our shops. It is played to a greater or less extent in almost every business and pleases a lot of men who think that because they can shift their responsibility to George, they are climbing up the ladder of business success and are getting on in the world.

The only man in your organization who has any right to "pass the buck" is the boss, and remember, he doesn't do it because he wants to but because he hasn't the time to assume personal responsibility for everything that takes place in the shop.

When the boss asks you to do a thing, do it yourself or see that it is done properly. If the boss had wanted George to do it he would have asked George in the first place. The fellow who insists on "passing the buck" all the time is likely to come to work some day and find that George has his job as well as his responsibility.—From "Doehler Topics."

## Chicago Pneumatic Tool Co. Elects A. E. Goodhue Vice President

The Chicago Pneumatic Tool Co., New York, announces the election of Allan E. Goodhue as vice president in charge of sales. Mr. Goodhue since May 1, 1919, has been managing director of the company's English subsidiary, the Consolidated Pneumatic Tool Co., London, England; also director of European sales for the Chicago Pneumatic Tool Co.

A. E. GOODHUE

Mr. Goodhue was for a number of years connected with the sales department of the Midvale Steel Co. and Midvale Steel and Ordnance Co., in Philadelphia, Chicago and Boston, leaving that company in March, 1918, to enter the service of the Government. From that time until Jan. 1, 1919, when he became connected with the Chicago Pneumatic Tool Co., he was assistant manager of the steel and raw material section, production division, of the Emergency Fleet Corporation.

Mr. Goodhue sails for New York on the "Olympic" and is scheduled to arrive in New York about July 3.

## Industrial Cost Accountants Have New Association

The Industrial Cost Accountants Association was organized in Chicago on June 18, by representatives of leading manufacturers.

The object of the new association is the standardization of accounting and cost terminology and the adoption of standard governing principles; the promotion of active co-operation and interchange of average experiences between representatives of manufacturers engaged in similar activities; the education of the members and their business associates in the complex economic problems of industry; to assist standardization committees in each line of industry; in establishing uniform accounting and cost practices; to act as a clearing house in distributing to all members the development in cost practices to the end that uniformity, once established, may be maintained.

M. F. Simmons of Schnectady, N. Y., Supervisor of costs for all General Electric Co. interests, was elected president of the association. C. H. Smith of Wilmerding, Pa., director of clerical operations of the Westinghouse Air Brake Co. interests, was elected first vice president. Roland H. Zinn, of New York, chief of the cost accounting bureau of the Tanners' Council, was elected second vice president. A. A. Alles, Jr., of Pittsburgh, secretary of the Fawcus Machine Co. and treasurer of the Schaffer Engineering and Equipment Co., was elected secretary-treasurer.

The headquarters of the association will be in Pittsburgh, at the office of the secretary-treasurer, 1501 Peoples Bank Building.

## Engineering Conference Addressed by Power-Press Experts

Safety engineers who have attracted national attention through their effective work in the safeguarding of power presses addressed the conference of the Engineering Section of the National Safety Council which was held in the auditorium of the Western Society of Engineers, Monadnock Building, Chicago, on June 24.

The entire afternoon session was devoted to a discussion of the safeguarding of power-press operations and the information brought out during this discussion was used in drafting the national safety code on power presses.

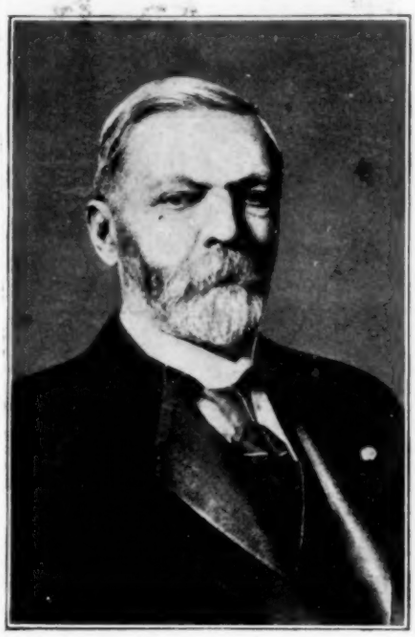
The evening meeting was held jointly with the Chicago Safety Council, the Western Society of Engineers, and the Accident Prevention Committee of the Illinois Manufacturers' Association.

# LD'S INDUSTRIAL FORGE

*News Editor*

## Brooklyn Bridge Builder Still Going Strong

Colonel Washington A. Roebling, vice president of the John A. Roebling's Sons Co., Trenton, N. J., on May 26 celebrated his eighty-third birthday by entertaining a number of relatives and friends at dinner at his home, 191 West State Street. Despite his age the Colonel is well and active, and makes daily trips to the Roebling offices to attend to business. Colonel Roebling was born at Saxemberg, Pa., May 26, 1837



COLONEL W. A. ROEBLING

and was graduated from the Rensselaer Polytechnic Institute, Troy, N. Y., when but 20 years old. Following his discharge from the army at the close of the Civil War he aided his father, John A. Roebling, in the work of bridge building. He completed the Brooklyn bridge at the death of his father.

## Know What Your Truck Costs

The value of maintaining a cost and performance record of motor truck operation is obvious. Except those who do keep such records, however, few appreciate just how invaluable they are.

Some inexperienced truck operators are prone to dismiss the task of maintaining records with the argument that it is a waste of time and money. To the contrary, experience proves that time and money thus invested yield handsome returns.

Said a user of six trucks recently: "A few months after we instituted a cost and performance record system, we were able to spot leaks which accounted for 25 per cent of our expense of operation."

Another user, a contractor operating 10 trucks, recently declared that even the owner of two trucks should maintain records.

"It furnishes," he said, "comparative figures to show just which truck is being operated efficiently. When records show high operating cost it sounds the alarm to investigate the cause, whether it be the fault of the driver, the operating system, or the truck itself."

The most important function of cost records, however, is to furnish the operator with a basic and accurate figure which will permit of no delusion as to the cost of doing business. This is especially important in contracting, trucking and other lines of business in which haulage is a principal item. In such business, in fact, success or failure often depends solely upon a true knowledge of transportation costs.

Unless the operator chooses to install one of the various cost system forms which are sold at a nominal sum, it is simple for him to devise one that fits his own business. But it would be advisable for the operator to study these systems before attempting to perfect one of his own, as they embody the experience of thousands of truck users.

## Automotive Engineers Against Compulsory Metric Law

On Monday, June 21, the Society of Automotive Engineers in business session at Ottawa Beach, Mich., unanimously adopted a resolution against the compulsory use of the metric system. The secretary was instructed to inform the Congressional Committees on the action of the Society.

## Disposes of $500,000 Surplus War Equipment

The Willys-Overland Corporation has sold to the Peninsular Machinery Co., of Detroit, 1,500 machine tools worth approximately $500,000. This machinery was ordered during the war, a large portion being delivered following the end of hostilities.

## J. J. Voelcker Made Foreman of Rockwood Co.

J. J. Voelcker, who recently took charge of the machine shop of the Rockwood Manufacturing Co., Indianapolis, has been a frequent contributor to the *American Machinist* for about fifteen years. His mechanical experience covers a wide field and he is only a little over forty. He learned the machinist's and toolmaker's trade in the good old-fashioned, thorough way, in the shop of the H. Mueller Manufac-

J. J. VOELCHER

turing Co., of Decatur, Ill., one of the largest plumbers' brass goods factories in the world. Later they made him foreman of their machine shop.

He next became foreman of the toolroom for the Link-Belt Co., Indianapolis, and left there to become superintendent of the Van Briggle Motor Device Co., in the same city. He stayed in this position three years and then went to the planning department of the Nordyke and Marmon Co. and from there to his present position. He has also at various times in his career, in order to gain experience, worked at the Rock Island Arsenal, Atlas Gas Engine Works, Stenotype Co. and the Ideal Brass Works.

Fred Thornley, director and works manager of W. Thornley & Sons, Ltd., Marrickville, Australia, is in this country for the purpose of purchasing new machinery. He is stopping at the Highland Court Hotel, Windsor Ave., Hartford, Conn., and is interested in toolroom equipment, including a hardening plant, grinding and milling machines, and automatic and turret lathes.

### Platform of the New York Citizens Transportation Committee

The following declaration of principles was adopted by the Citizens Transportation Committee of New York City, May 27, 1920: "The welfare of the Community being dependent on impartial and uninterrupted transportation service, all classes of people and merchandise should be served by transportation and trucking facilities without discrimination and there should be no interruption to such service through industrial warfare except as a last resort when all efforts of adjustment have failed and there is no impartial tribunal available to the parties presenting a grievance.

"Employees on piers, docks, railroads, steamships, lighters, tugs and trucks should perform their usual service regardless of whether the connecting points which they serve or the facilities or vehicles through which the merchandise is received or delivered are manned by union or non-union men.

"Impartial service should be extended to all merchandise regardless of whether it has been worked upon or handled by union or non union men."

## Personals

JOHN MC. C. PRICE has recently become associated with the Industrial Controller Co., Milwaukee, Wis., and has taken charge of the Chicago office. Mr. Price was formerly with the Mechanical Appliance Co., Milwaukee, as general sales manager.

WILLARD S. SISSON, secretary and treasurer of the D. & W. Fuse Co., Providence, R. I., will sever his connection with that company on June 15, as the plant is now operated by the General Electric Co., under a long-term lease. Mr. Sisson will continue in the electrical business.

T. W. MCMANUS for the last six years master mechanic for the Kellogg Switchboard and Supply Co., has taken over an interest in the Security Tool Works, Chicago. Mr. McManus has been elected vice president and has assumed the duties of general manager.

R. K. MORSE has been appointed Western manager of the Milwaukee Electric Crane and Manufacturing Co. Mr. Morse will have his headquarters in the Pittock Block, Portland, Ore.

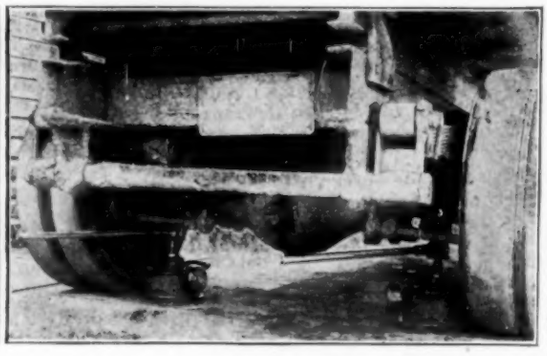
### Resolution Against Metric System

**By the Motor and Accessory Manufacturers Association at Atlantic City, April 26, 1920.**

Whereas, the members of this Association have formally registered their opposition to the adoption of the metric system on the grounds that it is uneconomic; that the disadvantages of the metric system are not offset by the advantages; that the benefits of the metric system do not justify the enormous expense which would be entailed through the necessary changes in sizes of product and equipment (which would mean an excessive loss through destruction of the present equipment not adapted to the new system); and through the education of employees and customers.

Therefore, be it resolved, that this committee express for the members of the Motor and Accessory Manufacturers Association its opposition to any legislative action which would result in making the adoption of the metric system of weights and measures obligatory, and further

Be it resolved, that this committee commend to the members of this Association the work of the American Institute of Weights and Measures in opposing the compulsory adoption of the metric system.



The instrument illustrated herewith is called the Loadometer and is being manufactured by the Black & Decker Manufacturing Co., Baltimore, Md. It is a portable device for determining the weight carried by a motor truck. The rear wheels are jacked up clear of the ground and the sum of the readings on the gages tells the load being carried by the rear axle. Many county and state police are now using these instruments and where these indicate that the truck is overloaded, the owner of the truck is haled into court and usually fined for violating the law. Much of the criticism that is being passed on the highway commissions and road engineers because of rapid deterioration of roads is actually caused by the operating of trucks with excessive loads.

## Obituary

### Whitfield P. Pressinger

Whitfield P. Pressinger, New York, vice president of the Chicago Pneumatic Tool Co., died on June 10 as a result of complications following an operation. Mr. Pressinger was actively engaged in the penumatic tool and allied machinery industry for many years. He was general manager of the Clayton Air Compressor Co. for seven years and became widely known through numerous activities in the American Society

WHITFIELD P. PRESSINGER

of Mechanical Engineers and the Compressed Air Society. He was born in New York City in 1871. In addition to the foregoing societies he was a member of the Sons of the Revolution, Seventh New York Regiment Veterans, F. and A. M., and the following clubs of New York City: Engineers, Lawyers, New York Athletic, New York Railroad, Columbia Yacht and the Machinery Club.

## Business Items

Labor troubles have caused the shutting down of the foundry department of the Brunswick Marine Construction Co., at Brunswick, Ga., and the company is preparing to ship the equipment and finished products of the department to another point, according to W. C. Irwin, manager of the plant.

The Yale & Towne Manufacturing Co., Stamford, Conn., has purchased the Industrial Electric Truck Division of the C. W. Hunt Co., of Staten Island. This new business will be combined with the Yale company's hoist depart-

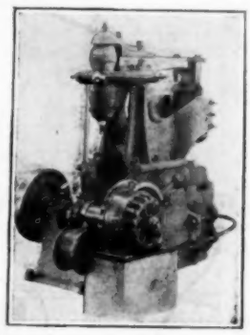
# Condensed-Clipping Index of Equipment

*Patented Aug. 20, 1918*

**Hammer, Helve, Motor-Driven**

C. C. Bradley, Inc., Syracuse, N. Y.

"American Machinist," June 10, 1920

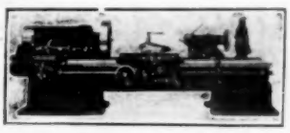


The hammer is controlled in the usual manner by a treadle, which applies and regulates the pressure of the idler pulley against the loose running belt. Formerly a motor was not included as part of the hammer equipment, and if used for the drive a separate countershaft with two loose pulleys between the motor and hammer was required. The illustration shows the drive arrangement now used.

**Lathe, Geared-Head, 26-In.**

Betts Machine Co., Rochester, N. Y.

"American Machinist," June 10, 1920



The headstock is of the all-geared inclosed type, being operated through an expanding-ring friction clutch operated from the apron. The movement which disengages the clutch automatically applies the friction brake. There are nine spindle speeds in geometric progression, two back gears being used. All shafts and gears are located in the lower half of the headstock, access being obtained by merely removing the cover. If individual motor drive is used, the motor is mounted on top of the headstock cover and geared to the main driving shaft.

**Milling Machine, Smi-Automatic, Multiple-Spindle**

Ingersoll Milling Machine, Rockford, Ill.

"American Machinist," June 10, 1920

This machine is of the reciprocating-table type, the feed being automatically controlled so that it increases while the cutters are passing through the clearance space. After loading the first fixture and starting the cut the operator loads the other fixtures, and he removes each casting as fast as it is finished. The machine shown has individual motor drive and two vertical and two horizontal spindles, but other machines of this type are made with different spindle arrangements. Table, 14 x 67 in. Floor space, 34 sq.ft. Weight, 10,000 lb.

**Press, Screw, Four-Post**

Manhattan Machine and Tool Works, Grand Rapids, Mich.

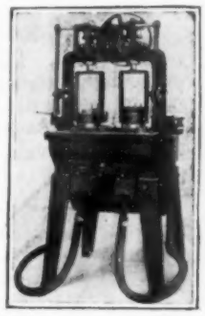
"American Machinist," June 10, 1920

This press, known as type BB, is intended for testing punches and dies and for other experimental work where a hand press of considerable power is required. Capacity, 80 tons. Bed, 20 x 36 in. Maximum distance bed to ram, 22 in. Diameter of screw, 3 in. Height, 77 in. Floor space, 31 x 41 in. Weight: net, 2,270 lb.; for shipment, 2,425 lb.; boxed for export, 2,600 lb. Size boxed, 58 cu.ft.

**Blasting Machine, Piston**

Gray Machine Tool Co., Inc., Buffalo, N. Y.

"American Machinist," June 10, 1920



The machine shown is adapted to cleaning with steel grit or shot the insides of pistons up to 3½ in. outside diameter, the air consumption being 40 cu.ft. per min. at 70 to 90 lb. pressure. The piston is placed in a holder with the open end downward, and when lowered by means of a lever it starts rotating. The work holders operate independently, thus allowing the work to be changed in one while the other is revolving. The drive pulley runs at 100 r.p.m. Floor space, 36 x 42 in. Weight, packed for shipment, 800 lb.

**Screwdriver**

The Ackland Specialty Co., 146 College St., Springfield, Mass.

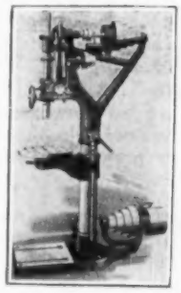
"American Machinist," June 10, 1920

This screwdriver with its attachments is intended for removing screws that cannot be turned by the ordinary hand tool. Three screwdriver blades, ⅜, ½ and ¾ in. widths, are furnished. These blades fit into a case-hardened socket in the extension post, upon which a ratchet wrench is fitted. The bar upon which the pressure is applied to hold the driver in the screw is attached to the extension post by a ball joint.

**Drilling Machine, Vertical, 20-In.**

The Hoosier Drilling Machine Co., Goshen, Ind.

"American Machinist," June 10, 1920

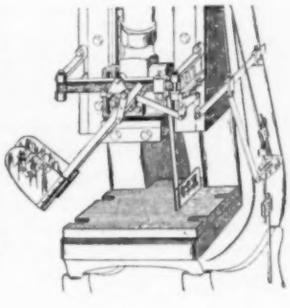


This machine is built in four different styles. No. 1 has a round base, plain drive and adjustable-lever feed; No. 2 is the same as No. 1 but has a rectangular base; No. 3 has a combined lever and worm feed; and No. 4, illustrated here, has back gears and power feed. An automatic stop attachment enables the operator to drill accurately to depth. The hole in the center of the table is machined in alignment with the spindle, so that it may be used for piloting a boring bar. Number of spindle speeds: 4 on plain-drive machine, 8 on back-geared machine. Three power feeds, 0.003, 0.005 and 0.008 in. Diameter of table, 16 in. Travel: spindle, 9¼ in.; table, 18 in.

**Guard, Safety, for Power Press**

D. & M. Guard Co., 6 State Street, Rochester, N. Y.

"American Machinist," June 10, 1920



The device has three guards, two of them standing normally at the left of the operator. The front guard moves with each stroke of the treadle, while the inner guard moves with each stroke of the ram. Each moves independently of the other, and serves to push the operator's hands away from the punch. A side guard prevents the feeding of the punch from the side. The device may be swung to one side to render the head accessible, and it may be easily attached to the press.

*Clip, paste on 3 x 5-in. cards and file as desired*

ment, and will thus put it in a position to furnish complete equipment for the moving of medium and light loads, either vertically or horizontally.

The Meisselbach-Catucci Manufacturing Co., of Newark, N. J., has purchased the shop of the Union Wheel Works, which is located at 51 Stanton St. in the Frelinghuysen Ave. factory development. The company is converting the building to meet its requirements, and with the added facilities afforded will be in a better position to meet the demand for M-C gears and M-C gear hobbing machines.

Recent advertisements of the Westinghouse Union Battery Co., Swissvale, Pa., have, unfortunately, led many to assume that the Westinghouse Electric and Manufacturing Co. was entering the storage-battery field. In order to clear away any misunderstanding, the Westinghouse Electric and Manufacturing Co. authorizes the statement that the Westinghouse Union Battery Co. is owned and controlled by the Westinghouse Air Brake Co., Wilmerdmg, Pa., and the Westinghouse Electric and Manufacturing Co. is not in any way connected with it.

The Metal Saw and Machine Co., Inc., Springfield, Mass., has been especially organized to take over the production of Napier metal-cutting machines, band saws, etc. The same officers who were president and treasurer of the Napier Saw Works, Inc., are now president and treasurer of the Metal Saw and Machine Co., Inc.

The Velco Manufacturing Co., Greenfield, Mass., has been incorporated under the laws of Massachusetts with a capital of $250,000. It has purchased the entire assets of the V. E. Lapointe Manufacturing Co., of Manchester, Conn., which it has moved to its new plant at Greenfield, Mass., where new machinery and equipment is now being installed. Frank O. Wells is president and J. T. Seller, treasurer.

At a recent board meeting of the directors of Manning, Maxwell & Moore, Inc., New York, Robert A. Bole, who has been a director and who is its general sales manager on the Pittsburgh end, was elected vice president of the firm. Mr. Bole has been with this company for a great many years, and is well known in the railroad and metal industries.

The plant of the New England Oil Refining Co., Fall River, Mass., built by Aberthaw of Boston, was put into operation on the arrival of 60,000 barrels of oil from a Southern port. The full pumping capacity of the new refinery is 5,000 barrels per hour.

Oscar Lindbom, president of Aktiebolaget Oscar Lindbom, Stockholm, Sweden, machine-tool dealer, is visiting this country for the purpose of making arrangements with American manufacturers of machine tools. Aktiebolaget Oscar Lindbom has recently taken over the machine-tool business, including showrooms and selling organization, of Aktiebolaget Galco, Ltd., which firm will devote its entire energies to export trade from Sweden. Mr. Lindbom's address while in this country will be in care of American Galco, Incorporated, Grand Central Palace, New York City.

## Export Opportunities

A manufacturing company in India desires to secure an agency for the sale of lathes and workshop gear, concrete and mortar mixers, locomotives and tipping wagons for broad and narrow gage lines, and cement, metals, etc. Quotations should be given c.i.f. Indian port. References. No. 33112.

A jute mills company in India desires to purchase a complete set of machinery for mill, machinery for preparing jute and spinning and weaving sacks. Quotations should be given c.i.f. Cocanada or Madras. Payment will be made cash on delivery of documents. No. 3,117.

An American trading company with connections throughout Europe desires to purchase and secure an agency for the sale of machines and tools for woodworkers, metal workers, blacksmiths, and toolmakers, also paper, cardboard, pulpboard, newsprint paper, etc. Payment will be cash against documents in New York. References. No. 33111.

A merchant in Scotland desires an agency for the sale in South Africa of baker, confectionery, and allied manufacturers' machinery. Quotations should be given f.o.b. New York. Payment will be cash against documents. References. No. 33126.

## Forthcoming Meetings

The International Railway Master Blacksmiths' Association will hold its next annual convention at Tutwiler Hotel, Birmingham, Ala., on Aug. 17, 18 and 19. The secretary of the association is A. L. Woodworth, Lima, Ohio.

The American Steel Treaters' Society and the Steel Treating Research Society will hold their second annual convention and exhibition at the Commercial Museum, Philadelphia, Pa., on Sept. 14 to 18, inclusive. J. A. Pollak, of the Pollak Steel Co., Cincinnati, Ohio, is secretary of the former society.

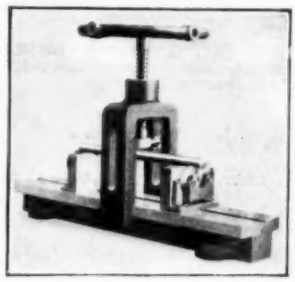
The American Foundrymen's Asssociation will hold its annual convention and exhibit at Columbus, Ohio, on Oct. 4 to 9. C. E. Hoyt, 1401 Harris Trust Building, Chicago, Ill., is secretary.

An exposition of U. S. manufacturers at Buenos Aires, Argentine Republic, S. A., has been arranged for the month beginning Nov. 15. Information can be obtained from the American National Exhibition, Inc., Bush Terminal Sales Building, 132 West 42nd St., New York.

# Condensed-Clipping Index of Equipment

*Patented Aug. 20, 1918*

**Straightening Machine, Bar**
Whitney Metal Tool Co., Rockford, Ill.
"American Machinist," June 10, 1920

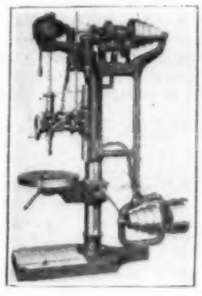


This machine is designed to straighten bar stock up to 2 in. diameter. The work is supported on V-blocks while being subjected to the action of the screw. Upon elevating the screw, the two sets of spring-actuated rolls lift the bar above the Vs, so that it may be easily rotated.

**Drilling Machine, Vertical, Geared**
Minster Machine Co., Minster, O.
"American Machinist," June 10, 1920

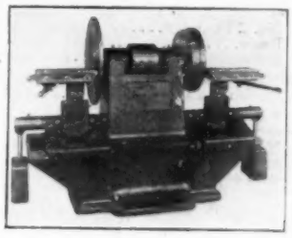
This machine for quantity production is known as the No. 12 Minster Junior. The spindle is driven by gears through a double-keyed driving sleeve, a ball thrust bearing being used. Tight and loose pulleys are part of the regular equipment, but a reversing clutch can be furnished for use when tapping. The feed is through gears, and the depth of the hole can be controlled by a dial which disengages the feed at the proper point. A compound table can be furnished. Capacity: will drill in steel, 2 in. Length of feed, 16 in. Table size, 18 x 20 in. Feed changes, 4. Speed changes, 6. Net weight, 2,800 lb.

**Drilling Machine, Vertical, 24-In.**
J. E. Snyder & Son., Worcester, Mass.
"American Machinist," June 10, 1920



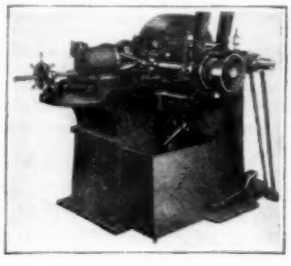
This machine has an adjustable head and tapping attachment and is designed for medium work. All gears are protected and the power feed is driven from the top shaft instead of the main spindle. A compound table and motor drive, either belt or chain connected, can be furnished. Capacity: drills to center, 24 in. Automatic feed, 10 in. Traverse: head, 17½ in.; table, 17 in. Diameter of table, 21 in. Ratio of back gears 5½ to 1. Speeds, 8. Feeds, 4. Motor required, 2 hp. Floor space, 22½ x 64 in.

**Grinding Machine, Disk**
Badger Tool Co., Beloit, Wis.
"American Machinist," June 10, 1920



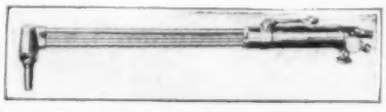
This machine, known as No. 8, has ball bearings for the spindle. The work tables are provided with lever feed and stops having micrometer adjustment. A pump and hoods for wet grinding can be furnished and the machine can be equipped with chucks to hold abrasive cylinders. Disk diameter, 26 to 30 in. Cylinder chuck diameter, 18 to 20 in. Speed: with disks, 6,000 ft. per min.; with chucks, 5,000 ft. per min. Work tables, 8 x 15 in. Shipping weight: domestic, 4,000 lb.; export, 4,500 lb. Export box, 130 cu.ft.

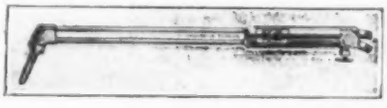
**Grinding Machine, Cylindrical, Centerless**
Russell, Holbrook and Henderson, Inc., 30 Church St., New York City.
"American Machinist," June 17, 1920



The model "B" machine is intended for grinding straight cylindrical work from ⅛ to 6 in. and up to 20 in. in length. The grinding wheel is 20 x 4 in. and mounted on a 3¼-in. shaft running in bronze bearings adjustable for wear. The feed wheel which holds the work against the grinding wheel runs at 48 r.p.m. For quantity production work a series of these machines can be used, each one reducing the work without changing the wheel adjustment. Where one machine is used it is necessary to pass the work through two or more times. Floor space, 48 x 68 in. Weight: net, 2,200 lb.; crated, 2,500 lb.

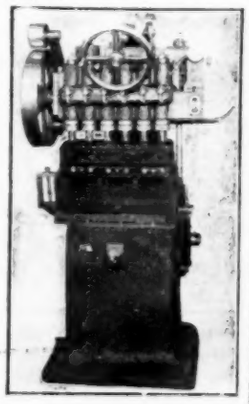
**Torch, Oxy-Acetylene, Welding, Cutting**
K-G Welding and Cutting Co., 556 West 34th St., New York City
"American Machinist," June 17, 1920





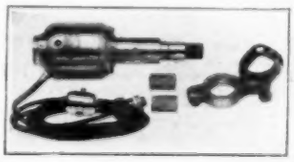
The heads, tips and nuts that are exposed to the heat are made of Monel metal. The claims made for the torches are low upkeep and long life, due to the high melting point and heat conductivity of the metal. The heat-resisting qualities of the tips are said to permit continuous work in certain cases without stopping to cool the torch before the weld is completed; also, that the joints are not likely to loosen from overheat and cause a flash back when working in corners and pockets.

**Profiling Machine, Multiple-Spindle, Automatic**
Automatic Machine Co., Bridgeport, Conn.
"American Machinist, June 17, 1920



The machine is intended for rapid production of irregular contours. Six spindles or less may be carried, the head casting being changed to conform to different types of work. The spindles are each driven by a bronze helical gear meshing with a single long steel helical gear on the driving shaft. The head is moved parallel to the length of the table by means of the cam on the right driven by worm gearing, and the table is moved in and out from the columns by means of a similar arrangement. The fixtures and tools are designed to suit the particular pieces of work to be done. Independent motor drive can be furnished. Floor space, about 5 x 6 ft. Weight, 6,000 lb.

**Truing Machine, Grinding Wheel**
The Precision Truing Machine and Tool Co., Cincinnati, Ohio
"American Machinist," June 17, 1920



The machine is intended for use in place of a diamond in truing abrasive wheels. It consists of a motor, abradent nib and a holder for fastening the motor to the grinding machine, and it can be operated by current from a lamp socket. The revolving nib approaches the wheel at an angle and is fed across the face of it in the same way as a diamond. Three 1-in. diameter general purpose nibs are furnished, but special nibs can be supplied.

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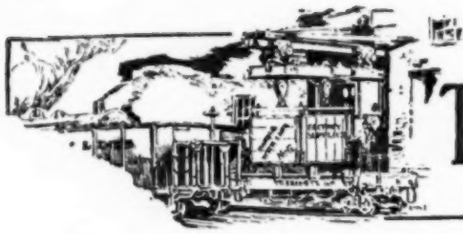


# THE WEEKLY PRICE GUIDE

## IRON AND STEEL

**PIG IRON**—Quotations compiled by The Matthew Addy Co.:

| CINCINNATI | Current | One Year Ago |
|---|---|---|
| No. 2 Southern | $45.60 | $29.80 |
| Northern Basic | 42.80 | 27.55 |
| Southern Ohio No. 2 | 46.80 | 28.55 |
| **NEW YORK—TIDEWATER DELIVERY** | | |
| 2X Virginia (Silicon 2.25 to 2.75) | 49.65 | 31.90 |
| Southern No. 2 (Silicon 2.25 to 2.75) | 49.70 | 33.95 |
| **BIRMINGHAM** | | |
| No. 2 Foundry | 42.00@44.00 | 25.75 |
| **PHILADELPHIA** | | |
| Eastern Pa., No. 2x, 2.25-2.75 sil. | 46@48.25* | ..... |
| Virginia No. 2 | 45.00* | 30.85 |
| Basic | 44.50† | 30.90 |
| Grey Forge | 43.50* | 30.90 |
| **CHICAGO** | | |
| No. 2 Foundry local | 44.25 | 27.25 |
| No. 2 Foundry, Southern | 47.00 | 31.75 |
| **PITTSBURGH, INCLUDING FREIGHT CHARGE FROM VALLEY** | | |
| No. 2 Foundry | 45.65 | 28.15 |
| Basic | 44.40 | 27.15 |
| Bessemer | 44.90 | 29.35 |
| **MONTREAL** | | |
| Silicon 2.25 to 2.75% | 43.25 | ..... |

* F.o.b. furnace. † Delivered.

**STEEL SHAPES**—The following base prices per 100 lb. are for structural shapes 3 in. by ¼ in. and larger, and plates ¼ in. and heavier, from jobbers' warehouses at the cities named:

| | New York | | | Cleveland | | Chicago | |
|---|---|---|---|---|---|---|---|
| | Current | One Month Ago | One Year Ago | Current | One Year Ago | Current | One Year Ago |
| Structural shapes | $4.47 | $3.97 | $3.47 | $5.50 | $3.37 | $3.97 | $3.47 |
| Soft steel bars | 4.62 | 4.12 | 3.37 | 5.00 | 3.27 | 3.87 | 3.37 |
| Soft steel bar shapes | 4.62 | 4.12 | 3.37 | ..... | 3.27 | 3.87 | 3.37 |
| Soft steel bands | 5.82 | 5.32 | 4.07 | 6.25 | ..... | ..... | ..... |
| Plates, ¼ to 1 in. thick | 4.67 | 4.17 | 3.67 | 5.00 | 3.57 | 4.17 | 3.67 |

**BAR IRON**—Prices per 100 lb. at the places named are as follows:

| | Current | One Year Ago |
|---|---|---|
| Mill, Pittsburgh | $4.25 | $2.35 |
| Warehouse, New York | 4.57 | 3.37 |
| Warehouse, Cleveland | 3.52 | 3.22 |
| Warehouse, Chicago | 3.75 | 3.37 |

**SHEETS**—Quotations are in cents per pound in various cities from warehouse; also the base quotations from mill:

| Blue Annealed | Large Mill Lots Pittsburgh | New York Current | New York One Year Ago | Cleveland | Chicago |
|---|---|---|---|---|---|
| No. 10 | 3.55-6.00 | 7.12@8.00 | 4.57 | 7.55 | 7.02 |
| No. 12 | 3.60-6.65 | 7.17@8.05 | 4.62 | 7.65 | 7.07 |
| No. 14 | 3.65-6.10 | 7.22@8.10 | 4.67 | 7.70 | 7.12 |
| No. 16 | 3.75-6.20 | 7.32@8.20 | 4.77 | 7.80 | 7.22 |
| Black | | | | | |
| Nos. 18 and 20 | 4.15-6.30 | 8.50@9.50 | 5.17 | 8.20 | 7.80 |
| Nos. 22 and 24 | 4.20-6.35 | 8.55@9.55 | 5.22 | 8.25 | 7.85 |
| No. 26 | 4.25-6.40 | 8.60@9.60 | 5.27 | 8.30 | 7.90 |
| No. 28 | 4.35-6.50 | 8.70@9.70 | 5.37 | 8.40 | 8.00 |
| Galvanized | | | | | |
| No. 10 | 4.70-7.50 | 9.75@11.00 | 5.50 | 8.50 | 8.15 |
| No. 12 | 4.80-7.60 | 9.85@11.00 | 5.55 | 8.60 | 8.20 |
| No. 14 | 4.80-7.60 | 9.85@11.10 | 5.60 | 8.60 | 8.35 |
| Nos. 18 and 20 | 5.10-7.90 | 10.10@11.40 | 5.90 | 8.90 | 8.65 |
| Nos. 22 and 24 | 5.25-8.02 | 10.25@11.55 | 6.05 | 9.05 | 9.05 |
| No. 26 | 5.40-8.20 | 10.40@11.70 | 6.20 | 9.20 | 9.20 |
| No. 28 | 5.70-8.50 | 10.70@12.00 | 6.50 | 9.50 | 9.50 |

Acute scarcity in sheets, particularly black, galvanized and No. 16 blue enameled.

**Automobile sheets are unavailable except in fugitive instances, when prices are 9.45c per lb. for No. 16; 9.50 for Nos. 18 and 20, and 9.55c for Nos. 22 and 24.**

**COLD FINISHED STEEL**—Warehouse prices are as follows:

| | New York | Chicago | Cleveland |
|---|---|---|---|
| Round shafting or screw stock, per 100 lb. base | $6.25 | $5.80 | $6.00 |
| Flats, square and hexagons, per 100 lb. base | 6.75 | 6.30 | 6.50 |

**DRILL ROD**—Discounts from list price are as follows at the places named:

| | Per Cent. |
|---|---|
| New York | 50 |
| Cleveland | 50 |
| Chicago | 50 |

**SWEDISH (NORWAY) IRON**—The average price per 100 lb., in ton lots is:

| | Current | One Year Ago |
|---|---|---|
| New York | $20.00 | $25.50-30.00 |
| Cleveland | 20.00 | 20.00 |
| Chicago | 21.00 | 16.50 |

In coils an advance of 50c. usually is charged.
Domestic iron (Swedish analysis) is selling at 12c. per lb.

**WELDING MATERIAL (SWEDISH)**—These prices are the best we have been able to obtain for Swedish welding materials, of which it is reported that very little are on the market.

| Welding Wire | | Cast-Iron Welding Rods | |
|---|---|---|---|
| 5/32, 11/64, 3/16, 1/4, 7/32, 5/16, No. 8, 3/32 and No. 10 | 21.00 to 30.00 | 1/16 by 12 in. long | 14.00 |
| 1/8 | | 1/16 by 19 in. long | 12.00 |
| No. 12 | | 3/32 by 19 in. long | 10.00 |
| 5/32, No. 14 and 1/16 | | 1/8 by 21 in. long | 10.00 |
| No. 18 | | Special Welding Wire, Coated | |
| No. 20 | | 1/8 | 33.00 |
| | | 5/32 | 30.00 |

**Domestic**—Welding wire in 100-lb. lots sells as follows, f. o. b. New York: 5/32, 8½c. per lb.; 1/8, 8c.; 5/32 to 1/4, 7½c.

**MISCELLANEOUS STEEL**—The following quotations in cents per pound are from warehouse at the places named:

| | New York Current | Cleveland Current | Chicago Current |
|---|---|---|---|
| Openhearth spring steel (heavy) | 7.00 | 8.00 | 9.00 |
| Spring steel (light) | 10.00 | 11.00 | 12.25 |
| Coppered bessemer rods | 9.00 | 8.00 | 6.75 |
| Hoop steel | 6.07 | 6.50 | 5.32 |
| Cold-rolled strip steel | 12.50 | 8.25 | 10.75 |
| Floor plates | 6.80 | 6.00 | 6.77 |

**PIPE**—The following discounts are to jobbers for carload lots on the Pittsburgh basing card, discounts on steel pipe, applying as from January 14, 1920, and on iron pipe from January 7, 1920.

| Inches | Steel Black | Steel Galvanized | Inches | Iron Black | Iron Galvanized |
|---|---|---|---|---|---|
| **BUTT WELD** | | | | | |
| 1/8, 1/4 and 3/8 | 47% | 20½% | 1/8 to 1¼ | 34½% | 18½% |
| 1/2 | 51% | 36½% | | | |
| 3/4 to 3 | 54% | 41½% | | | |
| **LAP WELD** | | | | | |
| 2 | 47% | 34½% | 2 | 28½% | 14½% |
| 2½ to 6 | 50% | 37½% | 2½ to 6 | 30½% | 17½% |
| **BUTT WELD, EXTRA STRONG PLAIN ENDS** | | | | | |
| 1/8, 1/4 and 3/8 | 43% | 25½% | 1/8 to 1/4 | 34½% | 19½% |
| 1/2 | 48% | 35½% | | | |
| 3/4 to 1¼ | 52% | 39½% | | | |
| **LAP WELD, EXTRA STRONG PLAIN ENDS** | | | | | |
| 2 | 45% | 33½% | 2 | 29½% | 16½% |
| 2½ to 4 | 48% | 36½% | 2½ to 4 | 31½% | 19½% |
| 4½ to 6 | 47% | 35½% | 4½ to 6 | 30½% | 18½% |

Stock discounts in cities named are as follows:

| | New York Black | New York Galv. | Cleveland Black | Cleveland Galv. | Chicago Black | Chicago Galv. |
|---|---|---|---|---|---|---|
| 1/8 to 3 in. steel butt welded | 40% | 24% | 40% | 31% | 54@40% | 40½@30% |
| 2½ to 6 in. steel lap welded | 35% | 20% | 42% | 27% | 50@40% | 37½@27½% |

Malleable fittings. Class B and C, banded, from New York stock sell at plus 32%. Cast iron, standard sizes, net.

## METALS

**MISCELLANEOUS METALS**—Present and past New York quotations in cents per pound, in carload lots:

| | Current | Month Ago | Year Ago |
|---|---|---|---|
| Copper, electrolytic | 18@19 | 19.25 | 18.00 |
| Tin in 5-ton lots | 48.50 | 61.50 | 72.50 |
| Lead | 8.00 | 9.00 | 5.35 |
| Spelter | 7.75 | 8.70 | 6.85 |
| **ST. LOUIS** | | | |
| Lead | 7.75 | 8.87½ | 5.10 |
| Spelter | 7.45 | 8.37½ | 6.50 |

At the places named, the following prices in cents per pound prevail, for 1 ton or more:

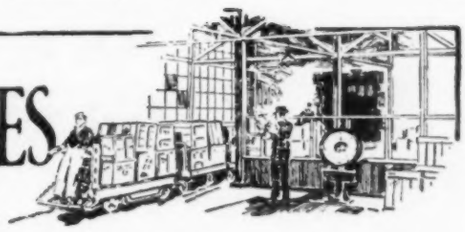
| | New York Current | New York Month Ago | New York Year Ago | Cleveland Current | Cleveland Year Ago | Chicago April 8 Current | Chicago April 8 Year Ago |
|---|---|---|---|---|---|---|---|
| Copper sheets, base | 33.50 | 29.50 | 26.00 | 32.00 | 26.50 | 36.00 | 27.00 |
| Copper wire (carload lots) | 31.25 | 31.25 | 24.00 | 29.50 | 26.50 | 27.00 | 23.00 |
| Brass sheets | 28.50 | 27.50 | 20.50 | 29.00 | 25.00 | 27.00 | 21.50 |
| Brass pipe | 33.00 | 32.00 | 30.75 | 34.00 | 33.00 | 35.00 | 31.00 |
| Solder (half and half) (case lots) | 33.00 | 39.00 | 38.00 | 40.50 | 41.00 | 38.00 | 39.00 |

Copper sheets quoted above hot rolled 16 oz., cold rolled 14 oz. and heavier, add 2c.; polished takes 5c. per sq.ft. extra for 20-in. widths and under; over 20 in., 7½c.

**BRASS RODS**—The following quotations are for large lots, mill. 100 lb. and over, warehouse; net extra:

| | Current | One Year Ago |
|---|---|---|
| Mill | 23.75 | 18.00 |
| New York | 25.00 | 19.50 |
| Cleveland | 27.00 | 24.00 |
| Chicago | 26.00 | 24.00 |

# SHOP MATERIALS AND SUPPLIES



**ZINC SHEETS**—The following prices in cents per pound prevail:

Carload lots f.o.b. mill ..... 12.00

| | —In Casks— | | — Broken Lots — | |
|---|---|---|---|---|
| | Current | One Year Ago | Current | One Year Ago |
| Cleveland | 15.00 | 12.95 | 15.50 | 13.30 |
| New York | 14.00 | 12.00 | 14.50 | 13.00 |
| Chicago | 15.00 | 16.50 | 15.00 | 16.00 |

**ANTIMONY**—Chinese and Japanese brands in cents per pound, in ton lots for spot delivery, duty paid:

| | Current | One Year Ago |
|---|---|---|
| New York | 8.00 | 8.50 |
| Chicago | 9.50 | 10.00 |

**OLD METALS**—The following are the dealers' purchasing prices in cents per pound:

| | — New York — | | | |
|---|---|---|---|---|
| | Current | One Year Ago | Cleveland | Chicago |
| Copper, heavy, and crucible | 16.00 | 15.00 | 16.50 | 16.50 |
| Copper, heavy, and wire | 15.25 | 14.00 | 16.50 | 15.00 |
| Copper, light, and bottoms | 13.75 | 12.00 | 15.00 | 14.00 |
| Lead, heavy | 7.00 | 4.62½ | 7.00 | 7.00 |
| Lead, tea | 5.00 | 3.75 | 5.00 | 6.00 |
| Brass, heavy | 10.25 | 8.75 | 12.50 | 16.50 |
| Brass, light | 7.50 | 7.00 | 10.00 | 9.50 |
| No. 1 yellow brass turnings | 8.50 | 8.50 | 10.00 | 10.00 |
| Zinc | 5.25 | 4.25 | 5.00 | 5.50 |

**ALUMINUM**—The following prices are from warehouse at places named:

| | New York | Cleveland | Chicago |
|---|---|---|---|
| No. 1 aluminum, 98 to 99% pure, in ingots for remelting (1-15 ton lots), per lb | 33.00 | 34.00c @ 35.00c. | 33.50 |

**COPPER BARS**—From warehouse sell as follows in cents per pound, for ton lots and over:

| | Current | One Year Ago |
|---|---|---|
| New York (round) | 38.00 | 25.00 |
| Chicago | 29.00 | 28.00 |
| Cleveland | 32.00 | 28.50 |

**BABBITT METAL**—Warehouse price per pound:

| | —New York— | | —Cleveland— | | — Chicago — | |
|---|---|---|---|---|---|---|
| | Current | One Year Ago | Current | One Year Ago | Current | One Year Ago |
| Best grade | 90.00 | 87.00 | 74.50 | 79.00 | 60.00 | 75.00 |
| Commercial | 50.00 | 42.00 | 21.50 | 17.50 | 15.00 | 15.00 |

## SHOP SUPPLIES

**NUTS**—From warehouse at the places named, on fair-sized orders, the following amount is deducted from list:

| | — New York — | | — Cleveland — | | — Chicago — | |
|---|---|---|---|---|---|---|
| | Current | One Year Ago | Current | One Year Ago | Current | One Year Ago |
| Hot pressed square | +$4.00 | 3.25 | $ .75 | $1.90 | $.50 | 2.00 |
| Hot pressed hexagon | + 4.00 | 2.70 | .75 | 1.90 | .50 | 2.00 |
| Cold punched hexagon | + 4.00 | 3.25 | .75 | 1.90 | .50 | 1.30 |
| Cold punched square | + 4.00 | 2.70 | .75 | 1.90 | .50 | 1.30 |

Semi-finished nuts, ⅝ and smaller, sell at the following discounts from list price:

| | Current | One Year Ago |
|---|---|---|
| New York | 30% | 50-10% |
| Chicago | 50% | 50% |
| Cleveland | 50% | 60-10-10% |

**MACHINE BOLTS**—Warehouse discounts in the following cities:

| | New York | Cleveland | Chicago |
|---|---|---|---|
| ½ by 4 in. and smaller | List | 20% | 20% |
| Larger and longer up to 1½ in. by 30 in. | +20% | 20% | 10% |

**WASHERS**—From warehouses at the places named the following amount is deducted from list price:

For wrought-iron washers:

New York ..... list Cleveland ..... $3.00 Chicago ..... $3.00

For cast-iron washers, ⅜ and larger, the base price per 100 lb. is as follows:

New York ..... $7.00 Cleveland ..... $4.50 Chicago ..... $4.75

**CARRIAGE BOLTS**—From warehouses at the places named the following discounts from list are in effect:

| | New York | Cleveland | Chicago |
|---|---|---|---|
| ½ by 6 in. and smaller | 10% | 15% | 10% |
| Larger and longer up to 1 in. by 30 in. | 10% | 10% | 5% |

**COPPER RIVETS AND BURS** sell at the following rate from warehouse:

| | Rivets | | Burs | |
|---|---|---|---|---|
| | Current | One Year Ago | Current | One Year Ago |
| Cleveland | 20% | 25% | 10% | 10% |
| Chicago | net | 10% | net | 10% |
| New York | 25% | 40% | net | 20% |

**RIVETS**—The following quotations are allowed for fair-sized orders from warehouse:

| | New York | Cleveland | Chicago |
|---|---|---|---|
| Steel ⅞ and smaller | 30% | 30% | 30% |
| Tinned | 30% | 30% | 30% |

Boiler, ¾, ⅞, 1 in. diameter by 2 to 5 in. sell as follows per 100 lb.:

New York ..... $6.00 Chicago ..... $5.37 Pittsburgh ..... $5.62

Structural, same sizes:

New York ..... $7.10 Chicago ..... $5.47 Pittsburgh ..... $5.72

## MISCELLANEOUS

**SEAMLESS DRAWN TUBING**—The base price in cents per pound from warehouse in 100-lb. lots is as follows:

| | New York | Cleveland | Chicago |
|---|---|---|---|
| Copper | 34.00 | 34.00 | 35.00 |
| Brass | 33.00 | 34.00 | 34.00 |

For immediate stock shipment 3c. is usually added. The prices, of course, vary with the quantity purchased. For lots of less than 100 lb., but not less than 75 lb., the advance is 2c.; for lots of less than 75 lb., but not less than 50 lb. advance is 5c. over base (100-lb. lots); less than 50 lb., but not less than 25 lb. 10c. should be added to base price; quantities from 10-25 lb., extra is 25c.; less than 10 lb., add 35c.

Double above extras will be charged for angles, channels and sheet metal mouldings if ordered in above quantities. Above extras also apply to brass rod other than standard stock sizes—stock sizes being considered as ⅛-2 in. inclusive in rounds, and ⅛-1½ in., inclusive, in square and hexagon—all varying by thirty seconds up to 1 in. by sixteenths over 1 in. On shipments aggregating less than 100 lb., there is usually a boxing charge of $1.50.

**LONG TERNE PLATE**—In Chicago No. 28 primes from stock sell, nominally, for $12.50 per 100 lbs.

**COTTON WASTE**—The following prices are in cents per pound:

| | — New York — | | | |
|---|---|---|---|---|
| | Current | One Year Ago | Cleveland | Chicago |
| White | 11.00@15.50 | 13.00 | 16.00 | 11.00 to 14.00 |
| Colored mixed | 7.00@10.50 | 9.00-12.00 | 12.00 | 9.50 to 12.00 |

**WIPING CLOTHS**—Jobbers' price per 1000 is as follows:

| | 13¼x13¾ | 13¼x20½ |
|---|---|---|
| Cleveland | 55.00 | 65.00 |
| Chicago | 41.00 | 43.50 |

**SAL SODA** sells as follows per 100 lb.:

| | Current | One Month Ago | One Year Ago |
|---|---|---|---|
| New York | $3.00 | $2.25 | $1.75 |
| Philadelphia | 2.75 | 2.00 | 1.75 |
| Cleveland | 2.50 | 2.50 | 2.75 |
| Chicago | 2.25 | 2.25 | 2.00 |

**ROLL SULPHUR** in 360-lb. bbl. sells as follows per 100 lb.:

| | Current | One Month Ago | One Year Ago |
|---|---|---|---|
| New York | $3.90 | $4.00 | $3.65 |
| Philadelphia | 3.65 | | |
| Cleveland | 4.25 | 4.25 | 3.62 |
| Chicago | 5.00 | 5.00 | 5.00 |

**COKE**—The following are prices per net ton at ovens, Connellsville:

| | June 10 | June 3 | May 27 |
|---|---|---|---|
| Prompt furnace | $14.50@$15.00 | $14.50@$15.50 | $14.50@$15.50 |
| Prompt foundry | 15.50@16.00 | 15.50@16.50 | 15.50@16.50 |

**FIRE CLAY**—The following prices prevail:

| | | Current |
|---|---|---|
| Ottawa, bulk in carloads | Per Ton | $8.00 |
| Cleveland | 100-lb. bag | 1.00 |

**LINSEED OIL**—These prices are per gallon:

| | — New York — | | — Chicago — | |
|---|---|---|---|---|
| | Current | One Year Ago | Current | One Year Ago |
| Raw in barrels (5 bbl. lots) | $1.63 | $1.90 | $2.02 | $2.10 |
| 5-gal. cans (without cans) | 1.66* | 2.03 | 2.27 | 2.30 |

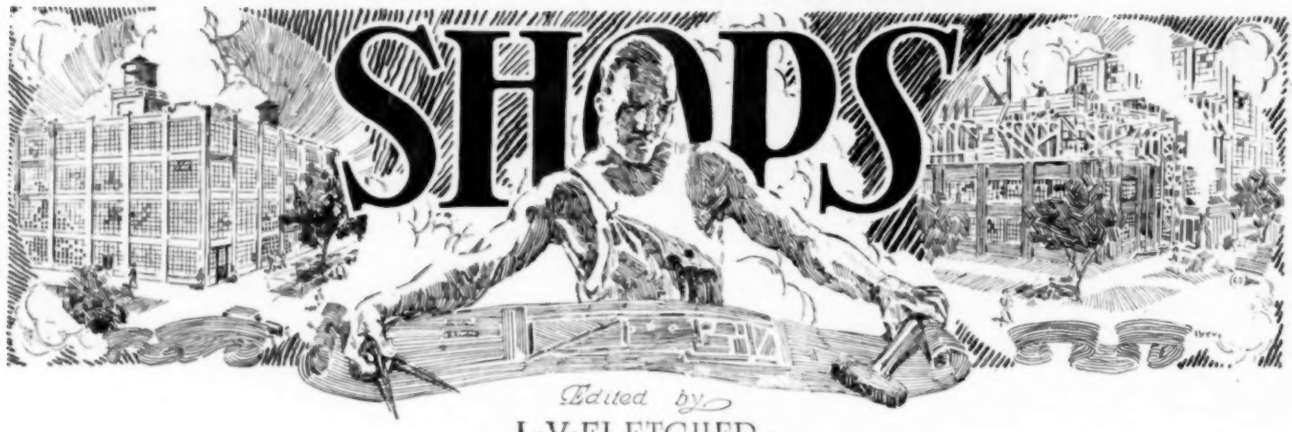
*To this *oil* price must be added the cost of the cans (returnable), which is $2.25 for a case of six.

**WHITE AND RED LEAD**—Base price per pound:

| | Red | | | | White | | | |
|---|---|---|---|---|---|---|---|---|
| | Current | | One Year Ago | | Current | | One Year Ago | |
| | Dry | In Oil | Dry | In Oil | Dry and In Oil | | Dry and In Oil | |
| 100 lb. keg | 15.50 | 17.00 | 13.00 | 14.50 | 15.50 | 13.00 | | |
| 25 and 50-lb. kegs | 15.75 | 17.25 | 13.25 | 14.75 | 15.75 | 13.25 | | |
| 12½-lb. keg | 16.00 | 17.50 | 13.50 | 15.00 | 16.00 | 13.50 | | |
| 5-lb. cans | 18.50 | 20.00 | 15.00 | 16.50 | 18.50 | 15.00 | | |
| 1-lb. cans | 20.50 | 22.00 | 16.00 | 17.50 | 20.50 | 16.00 | | |

500 lb. lots less 10% discount. 2000 lb. lots less 10-2½% discount.

# NEW and ENLARGED




Edited by
L·V·FLETCHER

## Machine Tools

The following concerns are in the market for machine tools:

**R. I., Providence**—Borland & Sons—one 15 ton hydraulic power press.

**Md., Baltimore**—The Carey Machine and Supply Co., 119 East Lombard St.—one horizontal radial drill with 25 in. horizontal traveling spindle, 24 x 65 in. table, distance between table and center of spindle about 29 in., to be equipped with arbor spindle arm adjustable to table.

**Md., Salisbury**—The Riverside Motor Co.—repair shop equipment.

**N. J., Jersey City** — The Universal Tobacco Machine Co.—one large drill press.

**N. J., Newark**—The Bd. Educ., City Hall—machine shop and forge equipment for Seymour Vocational School.

**N. Y., Buffalo**—The Auto Knitter Hosiery Co., 821 Jefferson St.—machine shop equipment.

**N. Y., Jamestown** — J. G. Townsend, Route 81—one blacksmith drill and press.

**N. Y., New York** (Borough of Manhattan)—Welborne & Co., Inc., 327 Bway.—planers, milling machines, slotters and lathes for export to Brazil.

**N. Y., New York** (Borough of Manhattan)—The Wern Mchy. and Eng. Co., 30 Church St.—one horizontal boring mill with 48 to 60 in. diameter and 8 or 9 in. boring bar.

**N. Y., Schenectady**—The General Electric Co., River Rd., A. R. Howgate, Purch. Agt.—for Baltimore, Md., plant—one open side planer with 30 in. x 30 in. x 10 ft. bed and 2 heads on cross rail, motor driven.

**N. Y., Syracuse**—The Franklin Automobile Co., 302 South Geddes St. — machine tool equipment for truck plant.

**Pa., Pittsburgh**—The Allegheny Forging Co., 511 Wood St.—one serpentine surface grinder, with 8 in. wheel for grinding trimmers in drop forge department.

**Pa., Waynesboro**—The Wayne Tool Mfg. Co.—one nut tapping machine.

**Ga., Atlanta**—The Abernathy Automatic Liquid Dispensing Machine Co., 2 North Pryor St.—drill presses, lathes, grinders, milling machines, power punches and motors.

**N. C., Wilmington**—The Atlantic Coast Line Ry., F. H. Fechtig, 1810 Princess St., Purch. Agt.—general machine tool equipment for repair and maintenance shops.

**W. Va., Wheeling**—C. L. Hills, 305 Natl. Bank Bldg.—one 30 to 36 in. x 10 ft. motor driven lathe (new or used).

**Ill., Aurora**—The T. Dunham Co.—one 1,000-1,200 ton hydraulic power press.

**Mich., Detroit**—The Standard Reamer & Tool Co., Elmwood Ave. and Hendric St.—equipment for machining small tools and reamers, electrically driven.

**O., Cleveland**—The Bd. Educ., East 6th St. and Rockwell Ave. — lathes, presses, saws, work benches and general shop and manual training equipment.

**Wis., Fond du Lac**—The Bulldog Tractor Co.—turret lathes, drill presses, shapers and a boring mill.

**Wis., Milwaukee**—The Amer. Value Rotator Co., 917 Chestnut St., H. Danischefsky., Purch. Agt.—milling machines, lathes, drill presses and grinders.

**Wis., Milwaukee**—The Badger Packard Mchy. Co., 338 South Water St., C. Mason, Purch. Agt.—vises, dies, drills and other bench tools.

**Wis., Milwaukee** — R. Lemke, 452 15th St.—one lathe with thread attachment.

**Wis., Milwaukee**—The Ramstack & Son Mfg. Co., 1826 Brown St.—drill presses.

**Wis., Sheboygan**—The Bd. Educ.—machine tools and machinery for machine shop.

**Tex., Dallas**—The Dallas Brass Mfg. Co., 1101 Ross Ave.—
One 16 in. x 6 ft. quick change gear engine lathe.
One small scroll saw for pattern shop.
One small jig saw for pattern shop.
One metal spur cutting saw (all used).

**Tex., Ft. Worth**—The Claypeel Machine Co., 1711 Calhoun St.—machine shop and foundry equipment.

**N. B., Moncton**—The Record Fdry. and Mchy. Co.—dustproof mills and stove top polishers.

**Ont., Toronto**—The A. R. Williams Mchy. Co., Ltd., 66 Front St., W.—one Blanchard high power vertical surface grinder.

## Machinery

The following concerns are in the market for machinery:

**N. Y., Buffalo**—The Amherst Auto Body Co., 99 Grey St., S. Horn, Purch. Agt.—one sheet metal rolling machine and one hair picking machine.

**N. Y., Buffalo**—The J. Dold Packing Co., 745 William St., J. J. Cuff, Purch. Agt.—hog iron scrapping machinery and conveyor chains.

**N. Y., Syracuse**—The Atmospheric Nitrogen Corp., c/o J. G. White Eng. Co., 43 Exch. Pl., New York City—traveling cranes.
One 25 ton for 70 ft. span;
One 25 ton for 56 ft. span;
One 35 ton for 35 ft. span;
One 25 ton for 30 ft. span;
One 25 ton for 17 ft. 8 in. span;
One 25 ton for 17 ft. span;
One 25 ton for 62 ft. span.

**Pa., Stroudsburg** — The Pennsylvania Steel and Wire Co.—wire straightening machines.

**Va., Newport News**—The Newport News Shipbuilding Co.—one 100 ton overhead traveling crane.

**Ill., Chicago**—The Bunge Bros. Coal Co., 1646 West Lake St.—one rip saw and carrier, to rip 12 x 12 in. timbers.

**Ill., Chicago** — The La Salle Iron Wks., 2365 South Halsted St.—rolling mill, heat treating equipment and pickling equipment.

**Ind., Ft. Wayne** — The Engineering Co., Winter and Wabash Sts.—one set of bending rolls of pyramid type to handle 12 ga. sheets 73 in. wide, and to roll to 7 in. diameter (used).

**Wis., Appleton**—The Hayton Pump and Blower Co., 575 2nd Ave.—one hand power crane.

**Wis., Madison**—The City, E. Parker, 819 West Johnson St., City Engr.—crane for pumping plant.

**Wis., Milwaukee** — The Modern Pattern Co., 150 Clinton St., G. Vierheilig, Purch. Agt.—woodworking machinery.

**Wis., Milwaukee**—W. Steinmetz, 449 7th Ave.—one 30 in. band saw, one 14 or 18 in. jointer, one sticker and one ripsaw.

**Wis., Milwaukee**—The Unger Toy Mfg. Co., 509 2nd Ave.—one baling machine.

**Wis., Waukesha**—F. C. Blair & Son, 340 Bway.—crane for foundry work.

**Wis., Wausau** — The Anderson Bros. & Johnson Co., East Manson St.—one 5 ton crane.

**Wis., West Allis** — The Sterling Wheelbarrow Co., 63rd and Pullen Aves., I. R. Smith, Pres.—molding machines and one blower for foundry.

**Tex., Dallas**—W. C. Headrick, Hickory St.—$15,000 worth of machinery for manufacture of iron beds.

**Tex., Houston**—The Star Engraving Co., Texas and Louisiana Sts., G. C. Yax, Purch. Agt.—one 2½ x 4 and one 6 x 10 ft. modern die, 6 plate press.

**Cal., Los Angeles**—The Fabri-Cord Tire Co., 917 Citizens Natl. Bank Bldg.—for San Pedro plant—$200,000 worth of machinery for tire manufacture.

## Metal Working

### NEW ENGLAND STATES

**Conn., Bridgeport** — The Eastern Auto Body Co. will soon award the contract for the construction of a 1½ story, 60 x 90 ft. factory on Lindley St., for the manufacture of automobile bodies. Estimated cost, $35,000.

**Conn., Bridgeport** — The Morris Metal Products Co., Union Ave., has awarded the contract for altering its plant on Union St. Estimated cost, $20,000.

**Conn., Fairfield**—The Bridgeport Deoxidized Bronze and Metal Co., Iron Ave., Bridgeport, has purchased a 23 acre site along the tracks of the New York, New Haven & Hartford R.R., here, and plans to build a factory.

**Conn., Hartford**—The J. M. Ney Co., Elm and West Sts., will soon award the contract for the construction of a 1 story, 50 x 75 ft. addition to its plant, for the manufacture of dentists' supplies. Estimated cost, $20,000. Ford, Buck & Sheldon, Inc., 60 Prospect St., Engrs. and Archts.

**Conn., Hartford** — The Puritan Motor Sales Co., 334 Pearl St., is having plans prepared by Butler & Provoost, Archts., 292 Main St., Stamford, for the construction of a 1 story, 50 x 150 ft. garage on Farmington Ave. Estimated cost, $40,000.

**Conn., Hartford**—The Royal Typewriter Co., Inc., 150 New Park Ave., is building a 5 story, 50 x 66 ft. and 50 x 308 ft. factory. Estimated cost, $250,000.

**Conn., New Britain**—The Mendel Sicklick Co., 117 Willow St., is having plans prepared by F. C. Walz, Archt., 348 Trumbull St., Hartford, for the construction of a 1 story garage on Arch St. Estimated cost, $40,000.

**Conn., Waterbury** — The Dexter Baking Co., North Main St., will build a 1 story, 62 x 105 ft. garage. Estimated cost, $20,000.

**Me., Biddeford**—The Saco Lowell Shop, 77 Franklin St., Boston, Mass., has awarded the contract for the construction of a 1 story, 160 x 200 ft. foundry at its plant. Estimated cost, $250,000.

**Mass., Dorchester** — Simons & Weiner, c/o S. S. Eisenberg, Archt., 15 Court Sq., Boston, will build a 1 story, 150 x 180 ft. garage on Dorchester Ave. and Faulkner St. Estimated cost, $100,000.

**Mass., Fairhaven** — The Fairhaven Mills will build a 1 story machine shop at its plant. Estimated cost, $40,000. Noted June 17.

**Mass., Holyoke**—J. & W. Jolly, Inc., South East St., have awarded the contract for the construction of a 2 story, 100 x 100 ft. foundry. Estimated cost, $75,000.

**Mass., Pittsfield** — The General Electric Co., Columbus Ave., will soon award the contract for the construction of a 1 story, 100 x 400 ft. factory for the manufacture of electric specialties. Estimated cost, $250,000. Noted May 6.

**Mass., Quincy**—P. S. Yerxa, 1452 Hancock St., has awarded the contract for the construction of a 1 story, 70 x 100 ft. garage on School St. Cost between $45,000 and $50,000. Noted May 13.

**Mass., Springfield**—The Western Massachusetts Cadillac Co., 521 Worthington St., has awarded the contract for the construction of a 1 story, 102 x 107 ft. garage and service station on State and Oak Sts. Estimated cost, $65,000.

**Mass., Worcester** — M. N. Ullman, 50 Water St., will soon award the contract for the construction of a 1 story, 80 x 95 ft. garage on School St. Estimated cost, $50,000. E. T. Chapin, 340 Main St., Archt. Noted June 24.

**R. I., Providence**—The Packard Motor Car Co., Bway. and 61st St., New York City, will soon award the contract for the construction of a 2 story, 190 x 205 ft. garage and service station on Plenty St. here. Estimated cost, $400,000.

**Vt., Brattleboro**—The C. F. Church Mfg. Co., Willimansett, Mass., has awarded the contract for the construction of a 1 story boiler house and 1 story, 50 x 175 ft. and 50 x 100 ft. factory here, for the manufacture of plumbers' supplies. Estimated cost, $80,000.

## MIDDLE ATLANTIC STATES

**Md., Baltimore**—The Natl. Enameling and Stamping Co., Race and Ostend Sts., has awarded the contract for the construction of a 3 story, 61 x 76 ft. addition to its tin stamping factory. Estimated cost, $100,000. Noted May 6.

**Md., Frederick** — The Frederick County School Comrs. have awarded the contract for the construction of a 2 story addition to the high school, to include a machine shop, etc.

**Md., Salisbury**—The Riverside Motor Co. is preparing plans for the construction of a 1 and 2 story, 60 x 100 ft. and 40 x 60 ft. garage and service station. Estimated cost, $25,000.

**Md., Sparrows Pt.** (Baltimore P. O.)—The Bethlehem Steel Corp., Bethlehem, Pa., plans to enlarge its plant here, to include new blast furnaces and the addition of 24 mills to the present tin plate plant. W. M. Tobias, Ch. Engr.

**N. J., Newark** — The McAllister Caron Co., 1001 Broad St., has awarded the contract for the construction of a 2 story, 70 x 150 ft. garage and service station. Estimated cost, $100,000.

**N. J., Trenton** — The Jackson Electric Motor Repairing Co. will build a 1 story, 42 x 100 ft. repair shop on Belvidere St. Estimated cost, $10,000.

**N. Y., Batavia** — The Batavia Specialty Co., Harvester Ave., plans to build a 70 x 250 ft. factory. Estimated cost, $100,000.

**N. Y., Buffalo** — The Eberhardt Steel Products Co., 41 Perry St., has had plans prepared for the construction of a 1 story, 100 x 200 ft. factory at 622-8 East Ferry St. Estimated cost, $30,000.

**N. Y., Buffalo**—The North Buffalo Hardware Fdry. Co., 743 Hertel Ave., has had plans prepared for altering its 1 story, 67 x350 ft. foundry. Estimated cost, $6,000.

**N. Y., Falconer**—The Jamestown Malleable Products Corp., Jamestown, plans to build a 400 x 400 ft. iron foundry, here. Estimated cost, $300,000.

**N. Y., New York** (Borough of Bronx)—J. W. Goff, 309 Bway., will build a 1 story, 100 x 220 ft. garage on Jerome Ave. and 177th St. Estimated cost, $50,000.

**N. Y., New York** (Borough of Brooklyn)—S. Ageloff, 126 Reid Ave., will build a 1 story, 200 x 256 ft. garage at 283 4th Ave. Estimated cost, $200,000.

**N. Y., New York** (Borough of Brooklyn)—The S. & R. Holding Co., 175 Bay 29th St., will build a 1 story, 100 x 173 ft. garage on Gold and Prospect Sts. Estimated cost, $150,000.

**N. Y., New York** (Borough of Brooklyn)—W. Nevin, 44 Court St., will build a 2 story, 100 x 107 ft. garage on Waverly and Fulton Sts. Estimated cost, $130,000.

**N. Y., New York** (Borough of Brooklyn)—S. Ransom, 401 West St., New York City, is building a 1 story, 150 x 200 ft. machine shop and transformer station at 518 Hamilton St., for marine repair work. Estimated cost, $250,000.

**N. Y., New York** (Borough of Brooklyn)—Stern & Friedman, c/o Cohn Bros., Archts., 361 Stone Ave., will build a 1 story garage on 60th St. and Ft. Hamilton Ave. Estimated cost, $30,000.

**N. Y., New York** (Borough of Manhattan)—L. Gold, 44 Court St., Brooklyn, will build a 5 story, 100 x 100 ft. garage and service station at 529 West 55th St. Estimated cost, $350,000.

**N. Y., New York** (Borough of Manhattan)—J. Reilly, 1901 Bathgate Ave., will build a 1 story, 75 x 110 ft. garage on 3rd Ave. and 175th St. Estimated cost, $35,000.

**N. Y., New York** (Borough of Manhattan)—The S. & Z. Bldg. Co., c/o J. M. Felson, Archt., 1133 Bway., will soon award the contract for the construction of a 3 story garage and service station on Manhattan and 130th Sts. Estimated cost, $120,000.

**N. Y., New York** (Borough of Manhattan)—S. Varschleisser, 215 East 67th St., will soon award the contract for altering his garage. Estimated cost, $50,000. J. M. Felsom, 1133 Bway., Archt.

**N. Y., Syracuse**—The Atmospheric Nitrogen Corp. has had plans prepared for the construction of a plant to include a 105 x 220 ft. machinery house, 62 x 105 ft. oxidation building and a 16 x 40 ft. hydrogen heater house. Estimated cost, $175,000. The J. G. White Eng. Co., 43 Exch. Pl., New York City, Engrs.

**Pa., Pittsburgh**—The Flocker Motor Co., Union Arcade Bldg., will soon award the contract for the construction of a 1 story, 75 x 100 ft. garage, service station and salesroom on Cypress and Aspen Sts. Estimated cost, $50,000. W. W. Williams, Magee Bldg., Archt.

**Pa., Stroudsburg** — The Pennsylvania Steel and Wire Co. is building a plant for the manufacture of cold drawn and cold rolled steel wire.

**Pa., Wilkes-Barre** — The W. B. Bertels Tin Co., Pennsylvania Ave., plans to build a 2 story, 70 x 75 ft. factory. Estimated cost, $30,000.

## SOUTHERN STATES

**Ga., Griffin**—A. F. Gosset & Sons is building a 2 story, 48 x 210 ft. garage and sales room. Estimated cost, $50,000.

**Ga., Savannah**—The Atlantic Coast Line Ry., c/o J. E. Willoughby, Ch. Engr., Wilmington, N. C., plans to build additions to the Southover shops here and install machinery. Estimated cost, $250,000.

**Tenn., Memphis**—The Continental Piston Ring Co., 650 Marshall St., is building a 153 x 217 ft. plant. Estimated cost, $75,000.

**Va., Schoolfield** (Danville P. O.)—The Dan River and Riverside Cotton Mills, Danville, are having preliminary plans prepared by E. R. James, Archt., Danville, for the construction of a 3 story school and community house here, to include a manual training department. Estimated cost, $150,000.

**W. Va., Parkersburg**—The Baldwin Tool Wks. plans to build a large addition to its plant.

## MIDDLE WEST

**Ill., Chicago**—The J. F. Jelke Co., 759 South Washtenaw Ave., is having plans prepared by Graham, Anderson, Probst & White, Archts., 1417 Ry. Exch. Bldg., for the construction of a garage and office building, each 2 story, 112 x 120 ft., on Washtenaw Ave. and Polk St. Estimated cost, $600,000.

**Ill., Chicago**—The E. Katzinger Co., 120 North Peoria St., manufacturer of bakers' supplies, plans to build a factory on Armitage and Cicero Aves. Estimated cost, $500,000.

**Ind., West Hammond**—The LaSalle Iron Works, 2305 South Halsted St., Chicago, will soon award the contract for the construction of a 1 story, 210 x 500 ft. plant here. Estimated cost, $650,000. N. Ronneberg, 10 South LaSalle St., Chicago, Engr. R. G. Pierce, 10 South LaSalle St., Chicago, Archt.

**Mich., Battle Creek** — The Montgomery Motor Sales Co. has awarded the contract for the construction of a garage. Estimated cost, $100,000. J. Woodward, Mgr.

**Mich., Detroit**—The A. Colton Co., 782 Jefferson Ave., will soon award the contract for the construction of a 2 story, 50 x 88 ft. addition to its factory for the manufacture of special machinery. Mildner & Eisen, 924 Hammond Bldg., Archts.

**Mich., Detroit**—The F. M. Foster Truck Co., 980 East Jefferson Ave., is preparing plans for the construction of a 4 or 5 story, 100 x 120 ft. service station.

**Mich. Detroit** — The International Metal Stamping Co., Artillery and Muster Aves., has awarded the contract for the construction of a 1 story, 79 x 532 ft. factory on Artillery Ave. Estimated cost, $130,000. Noted June 10.

**Mich., Detroit**—The Kirby Ave. Development Co., c/o Smith, Hinchman & Grylls, Archts., 110 Washington Arcade, is having plans prepared for the construction of a 2 story service station and garage. Estimated cost, $150,000.

**Mich., Detroit**—The Standard Reamer and Tool Co., Elmwood Ave. and Hendrie St., will soon award the contract for the construction of a 1 story, 50 x 100 ft. factory on Elmwood Ave. Estimated cost, $15,000. Pollmar & Ropes, 45 State St., Archts.

**O., Canton**—The Amer. Roll and Fdry. Co. will soon award the contract for the construction of a 1 story, 59 x 140 ft. addition to its machine shop and a 2 story, 45 x 80 ft. pattern shop. Estimated cost, $100,000. The United Eng. and Fdry. Co., Farmers Bank Bldg., Pittsburgh, Pa., Engrs.

**O., Cleveland**—The Bd. Educ., East 6th St. and Rockwell Ave., is having plans prepared by W. R. McCornack, Archt., c/o owner, for the construction of two 3 story, 30 room schools, one on East 116th and Corlett Sts. and another on Woodland Hill Park, both to have manual training departments. Estimated cost, $4,000,000.

**O., Cleveland**—The Champion Bed Spring Co., 3717 Iron Court, has awarded the contract for the construction of a 2 story, 58 x 172 ft. factory at 6500 Park Ave. Estimated cost, $80,000.

**O., Cleveland**—The Jeavons Spring Co., 1603 Prospect Ave., has awarded the contract for the construction of a 2 story, 30 x 50 ft. addition to its factory at 2540 Prospect Ave. Estimated cost, $25,000.

**O., Cleveland**—The Newburgh and South Shore Ry., c/o N. Stewart, Eng., Jones Rd., has awarded the contract for the construction of a 1 story, 113 x 260 ft. car shop on East 71st St. and Park Ave. Estimated cost, $110,000.

**O., Cleveland**—The Reynolds Motor Co., 8811 Miles Park Ave., is having plans prepared by H. T. Jeffrey, Archt., Northern Natl. Bank Bldg., for the construction of a 3 story, 50 x 160 ft. garage and sales room. Estimated cost, $125,000.

**O., Cleveland** — W. D. Sixt, c/o S. H. White, Archt., 1032 Schofield Bldg., will soon award the contract for the construction of a 1 story, 60 x 110 ft. garage and sales room at 6820 Euclid Ave. Estimated cost, $75,000.

**O., Cleveland**—The Superior Screen and Bolt Mfg. Co., 810 Hippodrome Bldg., is having plans prepared by the Realty Dept. of the Natl. Lamp Co., Archts. and Engrs., Nela Park, for the construction of a 2 story, 130 x 250 ft. factory, at 3652 East 93rd St. Estimated cost, $175,000.

**O., Geneva**—The Amer. Fork and Hoe Co., Swetland Bldg., Cleveland, has awarded the contract for the construction of a 1 story, 55 x 260 ft. factory, here. Estimated cost, $100,000.

**O., Mansfield**—The Ideal Electric Mfg. Co., 53 East 5th St., has awarded the contract for the construction of a 1 story, 160 x 450 ft. and 100 x 450 ft. factory and 2 story, 35 x 75 ft. office building. Estimated cost, $350,000.

**O., Massillon**—The Alloy Electric Steel Castings Co. has awarded the contract for the construction of a 1 story, 50 x 150 ft. mill. Estimated cost, $60,000.

**O., Ravenna** — The Natl. Furnace and Stove Co. is having plans prepared by D. C. Smith, Engr. and Archt., 4500 Euclid Ave., Cleveland, for the construction of a 1 story, 80 x 220 ft. foundry and office building. Estimated cost, $125,000. M. Minsman, Mgr.

**O., Toledo**—The Rock Bearing Co. will soon award the contract for the construction of a 2 story machine shop on Philip Ave. Estimated cost, $110,000. G. B. Phipafrank, 601 Gardner Bldg., Archt.

**Wis., Fond du Lac**—The Bulldog Tractor Co. has awarded the contract for the construction of a 1 story, 60 x 300 ft. factory.

**Wis., Milwaukee**—The Bd. of Pub. Wks. will soon award the contract for the construction of a 1 story, 50 x 120 ft. meter shop on Market St. Estimated cost, $50,000. C. E. Malig, City Hall, Archt.

**Wis., Milwaukee**—J. Luff, 864 16th St., will soon award the contract for the construction of a 1 story, 60 x 100 ft. garage on 11th St. Estimated cost, $25,000. G. Zagel, 144 Oneida St., Archt.

**Wis., Sheboygan** — The Bd. Educ. will soon award the contract for the construction of a 2 story, 270 x 300 ft. high school on Jefferson St. to include a machine shop. Estimated cost, $750,000.

**Wis., Sheboygan** — The Sheboygan Lime Wks., 822 Niagara Ave., has awarded the contract for the construction of a 2 story, 48 x 143 ft. garage and office building on South Water St. Noted June 17.

**Wis., Waukesha**—The Waukesha Fdry. Co. will build a 50 x 265 ft. factory for the manufacture of brass castings. Estimated cost, $30,000. F. J. Barker, Secy.

### WEST OF THE MISSISSIPPI

**Miss., Canton**—The Farmers Gin Co. will build a factory for the manufacture of cotton gins. Estimated cost, $20,000. F. H. Parker, Secy.

**Mo., St. Louis**—The Advance Electric Co., 6315 Maple Ave., has awarded the contract for the construction of a 1 story, 50 x 100 ft. addition to its factory. Estimated cost, $15,000.

**Mo., Salisbury**—The Riverside Motor Co. will build a 60 x 100 ft. sales and service station. Estimated cost, $30,000.

**Tex., Corsicana**—A company is being organized with $100,000 capital stock, and plans to build a factory for the manufacture of terracing machines. C. E. Kerr, Corsicana, Pres.

**Tex., Ft. Worth**—The Simmons Co., 1347 South Michigan Ave., Chicago, will soon award the contract for the construction of a warehouse and factory here, to have 15,000 sq.ft. of floor space, for the manufacture of metal beds. Estimated cost, $200,000. L. L. Hawes, Clark Ave., Archt.

**Tex., San Antonio**—The Alamo Iron Wks. is building a 90 x 160 ft. plant for the manufacture of oil well tools and supplies. Estimated cost, $30,000.

### CANADA

**N. B., Moncton**—The Record Fdry. and Mchy. Co. plans to build a 50 x 1140 ft. factory for the manufacture of stoves and furnaces. Estimated cost, $75,000. A. Wheeler, Moncton, Engr.

**Ont., Ft. William**—Sellers & Jones, Leith St., has awarded the contract for the construction of a 2 story, 60 x 100 ft. garage. Estimated cost, $35,000.

**Ont., Toronto**—Volles & Rottenberg, 609 Kent Bldg., are building a 1 and 2 story, 50 x 120 ft. garage, on College St. Estimated cost, $20,000.

**Ont., Windsor**—C. W. Ripley, 519 Sandwich St., plans to build a foundry. Estimated cost, $25,000.

**Ont., Windsor**—The Universal Car Agency, Chatham and Pelisier Sts., are having plans prepared by J. C. Pennington, Archt., LaBelle Bldg., for the construction of a 2 or 3 story garage on Chatham St. Estimated cost, $75,000.

## General Manufacturing

### NEW ENGLAND STATES

**Conn., Montville** — The R. Gair Paper Corp., Thames River Division, will soon award the contract for the construction of a 2 story, 250 x 400 ft. factory and 1 story, 50 x 50 ft. power house. Estimated cost, $500,000.

**Mass., Boston**—The Women's Educational and Industrial Union, 264 Boylston St., Boston, will soon award the contract for the construction of a 4 story bakery, etc., on Boylston St. to have about 15,000 sq.ft. of floor space. Estimated cost, $75,000. F. A. Norcross, 46 Cornhill St., Archt. Noted May 27.

**Mass., Cambridge**—The Barta Press Co., 28 Oliver St., Boston, will soon award the contract for the construction of a 1 and 3 story printing plant here. Estimated cost, $125,000. Monks & Johnson, 99 Chauncey St., Boston, Archts.

**Mass., Cambridge** — The Limited Plate Glass Co., 30 Sudbury St., Boston, has awarded the contract for the construction of a 2 story, 100 x 200 ft. factory on Albany St., here.

**Mass., Chelsea**—The State of Massachusetts, c/o State Adjutant General, Boston, has awarded the contract for the construction of a 2 story, 35 x 90 ft. laundry and power plant at the Soldiers Home, here. Estimated cost, $125,000.

**Mass., Gardner**—The Amer. Fibre Corp. has awarded the contract for the construction of a 1 story factory on Coleman St., to have 18,000 sq.ft. of floor space. Estimated cost, $75,000.

**Mass., New Bedford**—The W. C. Jones Co., Nash Rd., will soon award the construction of a 3 story addition to its mill on Church St., for the manufacture of textiles. Estimated cost, $75,000. T. M. James, 3 Park St., Boston, Archt.

**Mass., Woburn** — The Cambridge Paper Box Co., 196 Bway., has awarded the contract for the construction of a 2 story addition to its factory. Estimated cost, $50,000.

**R. I., Bristol**—The Cranston Worsted Co., 180 Thames St., will soon award the contract for the construction of a 4 story, 100 x 130 ft. addition to its plant. Estimated cost, $160,000. Jenks & Ballou, 1035 Grosvenor Bldg., Providence, Archts. Noted June 10.

**R. I., Providence**—The Cudahy Packing Co., 346 Canal St., will soon award the contract for the construction of a 3 story, 40 x 100 ft. packing plant. Estimated cost, $50,000. Private plans.

### MIDDLE ATLANTIC STATES

**Md., Baltimore** — The Chesapeake Mfg. Co., Sharp and Barre Sts., has awarded the contract for the construction of a 3 story, 42 x 125 ft. factory for the manufacture of furniture. Estimated cost, $125,000.

**N. J., Paterson**—The Sunburst Baking Co. will soon award the contract for the construction of a 3 story, 140 x 210 ft. bakery and a 2 story, 50 x 50 ft. stable. Estimated cost, $100,000. The McCormick Co., Century Bldg., Pittsburgh, Pa., Engrs. and Archts.

**N. Y., Buffalo**—The Auto Knitter Hosiery Co., 821 Jefferson St., has had plans prepared for the construction of a 2 story, 50 x 150 ft. addition to its factory, at 630 East Genesee St. Estimated cost, $37,000.

**N. Y., Buffalo**—The J. F. Pfister Co., 18 Metcalf St., manufacturer of vinegar, has had plans prepared for the construction of an addition to its factory. Estimated cost, $30,000.

**N. Y., New York** (Borough of Manhattan)—The Hill Ware Co., c/o the McCormick Co., Archts., 41 Park Row, will soon award the contract for the construction of a bakery on 165th St. Estimated cost, $100,000.

### SOUTHERN STATES

**Ala., Alexander City**—The Avondale Mills is having plans prepared by J. E. Sirrine, Engr., Greenville, S. C., for the construction of an 80 x 150 ft. weave shed addition, 100 x 100 ft. warehouse addition and a 60 x 100 ft. cloth room.

**Fla., Pensacola**—The Alexandria Cooperage and Lumber Co., Alexandria, La., will build a cypress mill, here. Estimated cost, $200,000.

**Ga., Griffin** — The Georgia Cotton Mills has awarded the contract for the construction of a bleachery addition.

**N. C., Durham**—The Lawrence Cotton Mills will build a 3 story, 60 x 80 ft. addition to its plant.

**N. C., Lexington** — The Dacotah Cotton Mills is building a 2 story, 53 x 194 ft. addition to its plant.

**N. C., Mooresville**—The Mooresville Cotton Mills has awarded the contract for the construction of a steam plant and bleachery. Noted April 22.

**S. C., Rock Hill**—The Arcade Mills is having plans prepared by J. E. Sirrine, Engr., Greenville, for the construction of a 2 story, 106 x 315 ft. mill. About 6,000 spindles will be installed.

**Tenn., Springfield** — The Tennessee and Kentucky Tobacco Co. plans to build a factory to replace the one which was recently destroyed by fire.

**Va., South Boston**—The Halifax Cotton Mills has awarded the contract for the construction of an addition to its mill. Noted April 1.

### MIDDLE WEST

**Mich., Bay City**—The Wildman Rubber Co., Book Bldg., Detroit, is maving plans prepared by the Osborn Eng. Co., Engrs. and Archts., 2848 Prospect Ave., Cleveland, for the construction of a 1 and 3 story rubber plant, here. Estimated cost, $2,000,000. Noted June 17.

**Mich., Flint** — The Standard Oil Co. of Indiana, 910 South Michigan Ave., will soon award the contract for the construction of a 2 story, 164 x 232 ft. oil distributing station to include a garage, office, warehouse and tank house. Estimated cost, $200,000.

**O., Garretsville**—The McWade Tire and Rubber Co., 711 Union Bldg., Cleveland, is preparing plans for the construction of a 2 story factory here, to have 30,000 sq.ft. of floor space. Estimated cost, $75,000.

**Wis., Eau Claire**—The Standard Oil Co. of Indiana, 910 South Michigan Ave., Chicago, will soon award the contract for the construction of a 1 and 2 story, 30 x 200 ft. oil distributing station, here, to include a warehouse, garage, office, etc. Estimated cost, $150,000.

### WEST OF THE MISSISSIPPI

**Kan., Ft. Scott**—The Ft. Scott Oil Co. has awarded the contract for the construction of an oil distributing station on Mahoney Ave. Estimated cost, $27,000.

**Kan., Ft. Scott**—The Standard Oil Co. will soon award the contract for the construction of a 1 story, 40 x 40 ft. oil distributing station on Market and Wall Sts. Estimated cost, $30,000.

### WESTERN STATES

**Cal., San Pedro** — The Fabri-Cord Tire Co., 917 Citizens Natl. Bank Bldg., Los Angeles, has purchased a 30 acre site on 17th St., here, and plans to build the first unit of its proposed plant, 3 story, 60 x 250 ft. Estimated cost, $80,000. Total estimated cost, $2,000,000.

### CANADA

**Ont., Brantford** — S. C. Johnson & Son, 1737 Wisconsin St., Racine, Wis., are having plans prepared for the construction of a factory here, for the manufacture of floor waxes, varnishes, etc.

**Ont., Ingersoll**—The Dominion Cone Co., Ltd., Marrow Ave., plans to build a 3 story factory for the manufacture of paper boxes. Estimated cost, $50,000.

**Que., Montreal**—The Knit to Fit Mfg. Co., Ltd., St. Lawrence Blvd., will soon award the contract for the construction of a factory on Parthenais and Larvinere Sts. Estimated cost, $254,000.

**Que., St. Anne de Monts**—The Great Eastern Pulp and Paper Co., London, Great Britain, will soon award the contract for the construction of a pulp and paper plant here.

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